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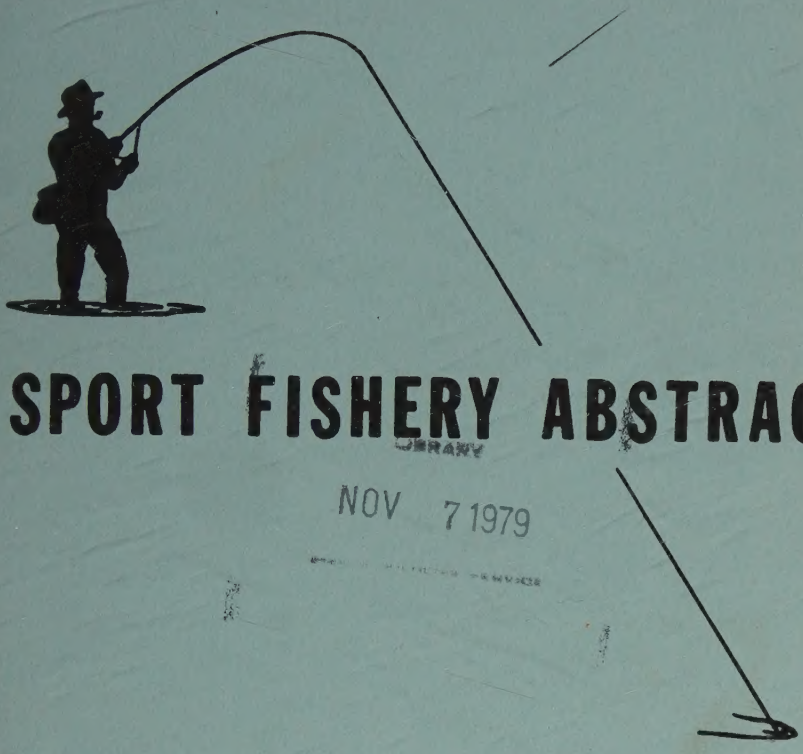

SPORT FISHERY ABSTRACTS

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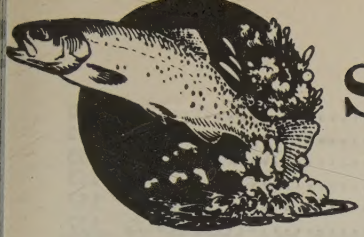

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An abstracting service for fishery research and management

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AQUATIC PLANTS AND THEIR CONTROL

79-001609 Cooke, G. D.; Gorman, M. E. EFFECTIVENESS OF A POLYPROPYLENE SHEETING IN CONTROLLING MACROPHYTE RE-GROWTH IN CCUNTRY LAKE (PORTAGE CO., OHIO). Ohio J. Sci. 79: 95. Apr. 1979. Abstract only. SFA 24(3)

[Dep. Biol. Sci., Kent State Univ., Kent, OH 44242] Excessive production of macrophytes ("weeds") in ponds and lakes represent a significant nuisance to recreational and other water-related activities. This project was designed to test the effectiveness of black spun-bonded polypropylene Dupont Typar sheeting in controlling the re-growth of macrophytes, when the sheeting is applied to exposed pond sediments which had been consolidated and frozen during pond drawdown. Following application in March, 1978, biomass samples from the experimental area were compared to samples from a nearby transect during summer, 1978. Dupcnt Typar stopped the re-growth cf macrophytes; only macroalgae and some /Najas flexilis/ grew on the sheeting. Biomass in the control area was always 100x or more than that of the covered area. High permeability of the sheeting allowed gases to escape, thus preventing "ballooning", a common fault of other sheeting compounds. Cost of application for selected lake or pond areas would be modest.

79-001610 Gorman, M. E. EFFECTS OF AN OVERWINTER DRAWDOWN ON MACROPHYTE DISTRIBUTION, ABUNDANCE, AND COMPOSITION IN A PERMANENT RECREATIONAL POND. Ohio J. Sci. 79: 95. Apr. 1979. Abstract only. SFA 24(3)

[Dep. Biol. Sci., Kent State Univ., Kent, OH 44242]

79-001611 Patnaik, S. CONTROL OF SOME AQUATIC VEGETATION IN FISH PONDS AT CUTTACK. J. Inland Fish. Soc. India 8: 221-226. Dec. 1976. SFA 24(3)

79-001612 Ramachandran, V.; Ramaprabhu, T.; Reddy, P. V. G. K. OBSERVATIONS ON THE USE OF AMMONIA FOR THE CONTROL OF /PISTIA STRATIOTES/ LINN. J. Inland Fish. Soc. India 7: 124-130. Dec. 1975. SFA 24(3)

Foliar spray of 1 percent aqueous ammonia solution was found to be very effective against /Pistia stratiotes/ Linn. The effect seemed to be enhanced by the addition of wetting agent Surf (0.25 percent). The dose of application worked out to 50 kg in 5,000 l of water per ha. The procedure for treatment is described. Plants were killed in 5-6 days after treatment and rotting took place quickly. No mortality of fish was observed.

79-001613 Ramachandran, V.; Ramaprabhu, T.; Reddy, P. V. G. K. A STANDARD FIELD TECHNIQUE OF CLEARANCE OF WATER HYACINTH INFESTATIONS BY CHEMICAL TREATMENT. J. Inland Fish. Soc. India 5: 154-161. Dec. 1973. SFA 24(3)

GENERAL FISH CULTURE

79-001614 Das, P.; Kumar, D.; Guha Roy, M. K. NATIONAL DEMONSTRATION ON COMPOSITE FISH CULTURE IN WEST BENGAL. J. Inland Fish. Soc. India 7: 112-115. Dec. 1975. SFA 24(3)

79-001615 Jhingran, V. G.; Gopalakrishnan, V. ESTUARINE FISHERIES RESOURCES OF INDIA IN RELATION TO ADJACENT SEAS. J. Mar. Biol. Assoc. India 15 (1): 323-334. 1973. SFA 24(3)

79-001616 Jhingran, V. G.; Gopalakrishnan, V.; Ray, P.; Ghosh, A. METHODOLOGY FOR SURVEY OF BRACKISHWATER AREAS IN INDIA FCR COASTAL AQUACULTURE. FAO Indo-Pac. Fish. Counc. Occas. Pap. 72/1. 36p. 1972. SFA 24(3)

79-001617 Jhingran, V. G. SCME ASPECTS OF BRACKISEWATER AQUACULTURE IN INDIA. Bull. Dep. Mar. Sci. Univ. Cochin 7 (1): 25-29. 1975. SFA 24(3)
[Cent. Inland Fish Res. Inst., Barrakpore, India]

79-001618 Policastro, A. S. CODDLING TROUT. Oceans 12 (2): 27-28. Mar.-Apr. 1979. SFA 24(3)

79-001619 Prabhakara Rao, A. V.; Gopalakrishnan, V. SEED RESOURCES AND BIONOMICS OF CULTURABLE BRACKISHWATER FISHES OF INDIA. J. Inland Fish. Soc. India 7: 142-155. Dec. 1975. SFA 24(3)

79-001620 Tripathi, Y. R. ADMINISTRATIVE AND FINANCIAL PROBLEMS OF PISCICULTURE. J. Inland Fish. Soc. India 6: 172-174. Dec. 1974.

TROUT AND SALMON CULTURE

79-001621 Anderson, D.; Woods, D. E. EVALUATION OF INTENSIVE INBREEDING FOR SELECTION OF TROUT BROOD STOCK. Minn. Dep. Nat. Resour. Sect. Fish. Invest. Rep. no. 364. i + 31p. Mar. 1979. SFA 24(3)
[Minn. Dep. Nat. Resour., St. Paul 55155] Rainbow trout of the Donaldson strain were closely indbred for three generations and were intensively selected for rapid growth to isolate fish that were homozygous for high growth rate. There was little or no gain in growth rate, but neither was there any indication of inbreeding depression. It was concluded that any segregation of homozygous fish with rapid growth through intensive selection was counteracted by the simultaneous selection of the most heterozygous fish with their "hybrid vigor". Unavoidable backcrossing continually diluted selection efforts in either direction and resulted in no improvement in growth.

79-001621 CONTINUED
It appears that improvement of growth rate can best be approached by selecting only for heterozygous vigor through a rotational line crossing breeding design that emphasizes the special influence of female brood fish.

79-001622 Combs, E. R.; Mayo, R. D.; Nash, C. E. A PRELIMINARY PHYSICAL AND ECONOMIC DESCRIPTION OF A PACIFIC SALMON HATCHERY IN SOUTHERN CHILE. Proc. Annu. Meeting World Maricult. Soc. 9: 425-430. 1978. SFA 24(3)
[Earl Combs Assoc., Mercer Island, WA 98040]

79-001623 Harrsch, M. L. CAUGHT TWIXT FARMER AND FISHERMAN. Oceans 12 (2): 57-58. Mar.-Apr. 1979. SFA 24(3)
A discussion of Oregon Aqua Food's Newport, Oregon Salmon ranch.--RS

79-001624 Hershberger, W. K. THE USE OF INTERPOPULATION HYBRIDIZATION IN DEVELOPMENT OF COHO SALMON STOCKS FOR AQUACULTURE. Proc. Annu. Meeting World Maricult. Soc. 9: 147-156. 1978. SFA 24(3)
[Coll. Fish., Univ. Wash., Seattle 98195] Three separate and apparently genetically distinct coho salmon (/Oncorhynchus kisutch/) stocks managed and reared by the Washington Department of Fisheries were crossed in a 3 x 3 factorial design. Data on early life history traits, such as mortality, time to 50 percent and 100 percent hatch, growth rate, and food conversion efficiency were taken for each of the nine possible crosses. Statistical analyses of the data demonstrated few significant differences among the crosses for traits expressed prior to the free feeding stage. After the fish started actively feeding, significant differences were found in growth rate and food conversion efficiency. These results could be explained in some instances by "hybrid vigor" and in other instances by the genes contained in one population. The data indicate that judicious use of interpopulation crosses could provide significant gains in the early rearing of coho salmon for aquaculture.

79-001625 Ramakrishna, K. V. TROUT CULTURE ON COMMERCIAL SCALE IN HIMALAYAN RANGES. J. Inland Fish. Soc. India 8: 184-193. Dec. 1976. SFA 24(3)

79-001626 Sanderson, C. H. SILO CULTURE--LINESVILLE FISH CULTURAL STATION. Riv. It. Piscic. Ittiop. 14 (1): 21-25. Jan.-Feb.-Mar. 1979. In English and Italian. SFA 24(3)
[Pa. Fish. Comm., Div. Fish., P.O. Box 127, Linesville 16424]

79-001627 Sehgal, K. L. TROUT CULTURE IN INDIA, ITS PRESENT STATUS AND FUTURE SCOPE. J. Inland Fish. Soc. India 6: 185-193. Dec. 1974. SFA 24(3)

79-001628 Smith, L. T.; Lemoine, H. L. COLCHICINE-INDUCED POLYPLOIDY IN BROOK TROUT. Prog. Fish-Cult. 41 (2): 86-88. Apr. 1979. SFA 24(3)
[Anim. Sci. Dep., Univ. R.I., Kingston 02881]

79-001629 Stockner, J. G.; Shortreed, K. R. S. LIMNOLOGICAL SURVEY OF 35 SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) NURSERY LAKES IN BRITISH COLUMBIA AND THE YUKON TERRITORY. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 827. iii + 47p. May 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-001630 Yu, T. C.; Sinnhuber, R. O.; Hendricks, J. D. EFFECT OF STEROID HORMONES ON THE GROWTH OF JUVENILE COHO SALMON (/ONCORHYNCHUS KISUTCH/). Aquaculture 16 (4): 351-359. Apr. 1979. SFA 24(3)
[Dep. Food Sci. Technol., Oreg. State Univ., Corvallis 97331] Two androgens, 17 alpha-methyltestosterone and testosterone, and an estrogen, estradiol, were individually incorporated in test diets at 2.5 mg/kg dry diet and fed to coho salmon for 14 weeks. The fish weight gain, feed conversion efficiency, fish body composition and fatty acid composition of fish body lipids were determined. The three steroid hormones all accelerate the growth rate of fish. The 17 alpha-methyltestosterone supplementation promotes significantly greater fish weight gain and feed efficiency. Results of histologic examination of fish liver, kidney, heart, and gonad are discussed.

OTHER ANADROMOUS SPECIES CULTURE

79-001631 Carreon, J. A. STUDIES ON THE CULTURE OF LARVAL STRIPED BASS /MORONE SAXATILIS/ (WALBAUM) IN CLOSED RECIRCULATING SYSTEMS. Ph.D. dissertation, Auburn Univ. 112p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(2):456. Aug. 1978. SFA 24(3)
Studies on the culture of larval striped bass in closed recirculating systems were conducted from March, 1976 through June, 1977. Two primary emphases of the research were the development of a closed culture system and the formulation of compounded diets that would promote larval survival and growth. different types of experimental aquaria were constructed. Larval behavior and survival as related to water currents and circulation patterns were studied in each of these aquaria before developing a final design. The resulting aquaria produced the desired water current and circulation believed vital to larval behavior of schooling, rheotaxis and feeding. Results indicated that water currents and circulation patterns were significantly related to larval behavior and energy expenditure and that, although food is of prime importance, favorable physical environmental conditions affecting the energy budget of the developing larvae must be provided first before the fish can effectively feed and survive. Experiments involving feeding with 10 different dietary formulations were conducted to obtain information on the physical and nutritional qualities of a suitable feed for the developing larvae. Stability and density were essential characteristics of the feeds which performed well in this study. Particles of the better rations stayed in circulation long enough and gave chance for the larvae to feed. Survivals as high as 95 percent for larvae fed live brine shrimp and 72 to 77 percent for larvae fed dry feeds were obtained for striped bass reared in specially designed closed recirculating culture system for 10 days of feeding at water temperatures above 20 degrees Celsius. Larval growth on brine shrimp was relatively fast at 0.17 mm

79-001631 CONTINUED
average daily gain in length, and was generally poor on formulated rations ranging from virtual shrinkage to 0.02 mm average daily gain.

79-001632 Murai, T.; Muller, J. W.; Andrews, J. W. DIETARY STUDIES WITH AMERICAN SHAD FRY. Prog. Fish-Cult. 41 (2): 61-63. Apr. 1979. SFA 24(3)
[Tunison Lab. Fish. Nutr., Hagerman Field Stn., Hagerman, ID 83332]

79-001633 Perry, W. G.; Carver, D. C.; Williams, A. M. BRACKISH WATER CULTURE OF STRIPED BASS IN LOUISIANA. Proc. World Maricult. Soc. 8: 107-115. 1977. SFA 24(3)
[La. Wildl. Fish. Comm., Grand Chenier 70643] Striped bass (/Morone saxatilis/) have been cultured in brackish water ponds since 1972 as part of Louisiana's anadromous fisheries project. Over the past five years, 648,872 fingerlings have been reared to stocking size in ponds with salinities ranging up to 10.8 ppt. Annual percent survival from fry to fingerling ranged from .03 percent in 1972 to 34.0 percent in 1976. Increased survival is attributed to improvements in nursery and pond rearing techniques. A bioassay in 1976 indicated two-day old fry were dead at 30 hours in 24.5 ppt salinity. Fry in 10, 15 and 20 ppt survived two weeks with no apparent harmful effect.

WARMWATER CULTURE

79-001634 Banerjea, S. M.; Ghosh, A. N. SOIL NUTRIENTS AND PLANKTON PRODUCTION IN FISH PONDS. A. AVAILABLE SOIL PHOSPHORUS. Indian J. Fish. 10 (2a): 627-633. 1963. SFA 24(3)

79-001635 Banerjee, R. K.; Banerjee, S. C.; Pakrasi, B. B. SILTATION IN DELTAIC REGIONS, ITS ROLE ON THE NUTRIENTS AVAILABILITY IN PONDS. J. Inland Fish. Soc. India 5: 208-214. Dec. 1973. SFA 24(3)

79-001636 Bhowmick, R. M.; Kowtal, G. V. SIMPLIFIED TECHNIQUE OF HYPOPHYSATION OF MAJOR CARPS. J. Inland Fish. Soc. India 5: 218-222. Dec. 1973. SFA 24(3)

79-001637 Bronzi, P. ESPERIENZE PRELIMINARI IN ITALIA DI PISCICOLTURA TERMICA MEDIANTE GABBIE GALLEGGIANTI. [PRELIMINARY RESEARCH OF FISH CULTURE IN CAGES FLOATING IN THERMAL EFFLUENT FROM A POWER PLANT IN ITALY.] Riv. It. Piscic. Ittiop. 14 (1): 4, 7-12. Jan.-Feb.-Mar. 1979. In Italian with English summ. SFA 24(3)
[ENEL, Cent. Ricerca Termica e Nucleare, Bastioni di Porta Volta 10, Milano, Italy] A preliminary experimental fish culture has been realized in the discharge canal of an oil fired power station ("La Casella", on Po river, 30 km upstream Piacenza, Italy). A lot of common carp (/Cyprinus carpio/) was held in a cage of approximately 5 cubic meter capacity. The individual weight of carp was ranging on 17 g at starting and on 1,100 g (maximum value 2,700 g) after 413 days. Fish were fed ad libitum by dry pellet delivered with a demand feeder. Mortality was quite negligible. Serial samples, amounting to 197 carp, were taken for histopathological examinations and for heavy metals residues in fish and fish organs. Carp were overcrowded in the cage (176.4 kg/m^3). The author emphasizes that if such method will be operated in the future in all the outlet canal, the potential

79-001637 CONTINUED
production may be tremendous (700 ton of fish/year).

79-001638 Cancellieri, S. LA "VIA ITALIANA" ALL'ANGUILLICOLTURA. [THE ITALIAN WAY TO EELFARMING.] Riv. It. Piscic. Ittiop. 14 (1): 1-3. Jan.-Feb.-Mar. 1979. In Italian with English summ. SFA 24(3)
[Assoc. Piscic. It., Via Indexendenza, 5-3100 Treviso, Italy]

79-001639 Chakrabarty, R. D.; Murty, D. S.; Sen, P. R.; Nandy, A. C; Chakrabarty, D. P. PERIODIC HARVESTING TO ENHANCE PRODUCTION IN COMPOSITE CULTURE OF INDIAN AND EXOTIC CARPS. J. Inland Fish. Soc. India 6: 167-171. Dec. 1974. SFA 24(3)

79-001640 Chakrabarty, R. D.; Sen, P. R.; Rao, N. G. S.; Jena, S.; Janaki Ram, K. PRELIMINARY OBSERVATIONS ON THE PERFORMANCE OF /MUGIL CEPHALUS/ (LINNAEUS) IN FRESHWATER PONDS UNDER COMPOSITE CULTURE. J. Inland Fish. Soc. India 8: 125-128. Dec. 1976. SFA 24(3)

79-001641 Chakrabarty, R. D.; Murty, D. S.; Sen, P. R.; Nandy, A. C; Chakrabarty, D. P. SHORT-TERM REARING OF INDIAN AND EXOTIC CARPS. J. Inland Fish. Soc. India 8: 179-183. Dec. 1976. SFA 24(3)
Experiments conducted at the Killa Fish Farm, Cuttack, from 1968-1970 in raising Indian and exotic carps for periods of 6 months are described. A stocking density of 3,000 fish/ha is found suitable for such short-term rearing. Short-term fish culture would make it possible to utilize a large number of seasonal ponds in the country for fish production.

79-001642 Ghosh, A.; Banerjee, M. K.; Hanumantha Rao, I. SOME OBSERVATIONS ON THE CULTURAL PROSPECTS OF SILVER CARP /HYPOPHTHALMICHTHYS MOLITRIX/ (VALENCIENNES) IN SEWAGE-FED PONDS. J. Inland Fish. Soc. India 5: 131-133. Dec. 1973. SFA 24(3)

79-001643 Ghosh, A.; Hanumantha Rao, L.; Banerjee, S. C. STUDIES ON THE HYDROBIOLOGICAL CONDITIONS OF A SEWAGE-FED POND WITH A NOTE ON THEIR ROLE IN FISH CULTURE. J. Inland Fish. Soc. India 6: 51-61. Dec. 1974. SFA 24(3)

79-001644 Jackson, U. T. CONTROLLED SPAWNING OF LARGEMOUTH BASS. Prog. Fish-Cult. 41 (2): 90-95. Apr. 1979. SFA 24(3)
[U.S. FWS, Box 25007, Denver Fed. Cent., Code 1522B, Denver, CO 80225]

79-001645 Jana, B. B. PRIMARY PRODUCTION AND BACTERIOPLANKTON IN FISH PONDS WITH MONO AND POLYCULTURE. Hydrobiologia 62 (1): 81-87. 8 Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Kalyani, Kalyani 741235, West Begal, India]
Estimates of primary production in relation to bacterioplankton growth kinetics have been made in three fish ponds with mono and polyculture in the Fish Farm Nivka, Kiev, USSR. Since the basic process of primary production is dependent upon such prevailing conditions as temperature, light and nutrient rather than upon the introduction of fish species, almost similar production rates were obtained in these ponds, with the variance ratio found not significantly different from zero (P is greater than 0.05). So was the case with bacterioplankton growth kinetics (P is greater than 0.05). A maximal gross production

79-001645 CONTINUED
coupled with a bacterioplankton peak was demonstrated in the summer month of July with the rise of temperature of the water, while minimal production was observed in September. The effect of season was highly significant (P is less than 0.001) upon both primary production and bacterioplankton. Extreme deficiency of the net photosynthetic production of O(2) was observed in summer due to less prevalence of phytoplanktonic algae as a consequence of heavy grazing by the herbivorous fishes at the time of their active growth. A plot of biochemical oxygen demand as function of the respiratory loss of O(2) due to bacterial population showed a direct linear relationship (P is less than 0.001). Lack of definite correlation (P is greater than 0.05) was indicated between the BOD and the total bacterioplankton population. There existed no definite relationship (P is greater than 0.05) between primary production and bacterioplankton, perhaps because of the very low percentage of autotrophic photosynthetic bacteria and abundance of heterotrophic bacteria in the composition of total bacterioplankton.

79-001646 Jensen, G. L.; Shelton, W. L. EFFECTS OF ESTROGENS ON /TILAPIA AUREA/: IMPLICATIONS FOR PRODUCTION OF MONOSEX GENETIC MALE TILAPIA. Aquaculture 16 (3): 233-242. Mar. 1979. SFA 24(3)
[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn 36830] Three naturally occurring estrogens, estriol, estrone and 17-Beta estradiol, were each administered perorally at three concentrations for 3- or 5-week periods to fry of /Tilapia aurea/, 8-11 mm long. Estrogen treatment neither affected survival nor altered growth of fry. Post-treatment stocking in outdoor concrete tanks revealed no apparent differences in survival between hormone-treated and untreated fish after 99-148 days. Gonadal examination of treated and untreated groups after growth trials revealed no aberrant sex ratios in the groups treated with estrogen, but in all treatment groups there were significant proportions of males with a female-like urogenital papilla. Greater proportions of such 'atypical' males occurred at the higher estrogen dosage levels and in the longer treatment period. No atypical males were found in the control groups. Sexing of fish that died after treatment indicated no difference in the death rate of the sexes. Histological examination of gonads revealed no alteration of normal male and female germ cell development; pseudo-oocytes were present in both treated and untreated groups. No ovotestis condition was observed. Male and female homogamety among different tilapia species and a method for producing monosex genetic males from matings of sex-reversed brood stock are discussed.

79-001647 Khan, H. A.; Mukhopadhyay, S. K. PRODUCTION OF STOCKING MATERIAL OF SOME AIR-BREATHING FISHES BY HYPOPHYSATION. J. Inland Fish. Soc. India 7: 156-161. Dec. 1975. SFA 24(3)

79-001648 Ledgerwood, R. D.; Hughes, D. G.; Vargas Ortiz, M. WET AND DRY SEASON COMPARISON OF /TILAPIA AUREA/ PRODUCTION IN EL SALVADOR IN NEW FERTILIZED AND UNFERTILIZED EARTHEN PONDS. Proc. Annu. Meeting World Maricult. Soc. 9: 357-371. 1978. SFA 24(3)
[NMFS, Rt. 1, Box 236-A, Clatskanie, OR 97016] Two 14-week fertilization experiments were conducted in newly constructed earthen ponds on the tropical coastal plain of El Salvador. A combination of 0-20-0 plus chicken manure applied during the dry season produced a higher biomass (5853 net kg/ha per year) of the phytoplanktivorous fish /Tilapia aurea/ than did 20-20-0, 0-20-0, or chicken manure alone (4643, 4977, and 2486 net kg/ha per year, respectively). All treatments including an inorganic fertilizer were significantly more productive than treatments receiving only chicken manure. Ponds

79-001648 CONTINUED
receiving chicken manure alone were twice as productive as unfertilized control ponds, which had an average net production of 1240 kg/ha per year. The inclusion of nitrogen in the inorganic formulas did not enhance fish production; rather, it appeared that phosphorus was the limiting factor. The fertilizer applied during the wet season produced 48 percent less net fish production than the same fertilizer applied at a similar rate in the dry season. Increased turbidity from bank erosion following heavy rains appeared to limit wet season fish production. The 0-20-0 plus chicken manure fertilizer combination during the dry season produced higher net earnings ($1285/ha per year) than any other treatment.

79-001649 Mathur, P. K.; Malhotra, J. C.; Mehrotra, S. N.; Shah, K. L. EXPERIMENTS ON THE NURSERY REARING OF SPAWN OF /HILSA ILISHA/ (HAMILTON) IN FRESHWATER PONDS. J. Inland Fish. Soc. India 6: 205-210. Dec. 1974. SFA 24(3)

79-001650 Murai, T. HIGH-DENSITY REARING OF CHANNEL CATFISH FRY IN SHALLOW TROUGHS. Prog. Fish-Cult. 41 (2): 57. Apr. 1979. SFA 24(3)
[Tunison Lab. Fish. Nutr., Hagerman Field Stn., Hagerman, ID 83332]

79-001651 Pecor, C. H. EXPERIMENTAL INTENSIVE CULTURE OF TIGER MUSKELLUNGE IN A WATER REUSE SYSTEM. Prog. Fish-Cult. 41 (2): 103-108. Apr. 1979. SFA 24(3)
[Mich. Dep. Nat. Resour., Wolf Lake State Fish Hatchery, Mattawan 49071]

79-001652 Raman, K.; Ghosh, S. P.; Chatterjee, D. K. STUDIES ON THE ECOLOGY OF FISH PONDS WITH SPECIAL REFERENCE TO BOTTOM FAUNA. J. Inland Fish. Soc. India 7: 173-181. Dec. 1975. SFA 24(3)

79-001653 Ranadhir, M.; Gopalakrishnan, V. THE PROFITABILITY OF CARP FRY CULTURE IN HOWRAH AND HOOGHLY DISTRICTS OF WEST BENGAL. J. Inland Fish. Soc. India 5: 189-194. Dec. 1973. SFA 24(3)

79-001654 Rickards, W. L.; Jones, W. R.; Foster, J. E. TECHNIQUES FOR CULTURING THE AMERICAN EEL. Proc. Annu. Meeting World Maricult. Soc. 9: 641-646. 1978. SFA 24(3)
[UNC Sea Grant Prog., Room 105, 1911 Bldg., N.C. State Univ., Raleigh 27650] American eels (/Anguilla rostrata/) have been cultured from the elver stage to marketable size in a flow-through freshwater system. Elvers were captured in coastal freshwater streams using fine mesh dip nets and traps. The young eels were then held in indoor tanks where they became adapted to feeding on a prepared diet and they were treated for external parasites and diseases. When outdoor water temperatures stabilized above 18°C, the eels were transplanted to grow-out ponds and reared to market size in 14 to 18 months. The culture techniques described in this paper include: 1) obtaining elvers, 2) disease prophylaxis, 3) feeding adaptation, and 4) pond grow-out. Details are presented concerning elver harvesting and transport, diets and feeding methods, and the culture system.

79-001655 Roberts, K.; Bauer, L. UNITED STATES MARICULTURE DEVELOPMENT AND THE ECONOMIC EVOLUTION OF CATFISH SYSTEMS AS PARADIGMS OF RELEVANCE. Proc. Annu. Meeting World Maricult. Soc. 9: 375-382. 1978. SFA 24(3)

[Off. Sea Grant Dev., La. State Univ., Baton Rouge 70803]

Commercial catfish systems are frequently referred to as systems to be emulated in the public process of developing mariculture plans and legislation for the United States. The economic evolution of catfish culture is reviewed to identify the role of the public sector and market forces. An examination of catfish production operations of approximately 65 ha reveals near zero growth in returns on investment over the past 7 years. Following some technological improvements in the latter part of the last decade, the economic impact of technological change is not evident. High level managerial skill applied to the ponds and business are of paramount importance. A conclusion is that publicly supported pilot-scale demonstrations should find justification in the testing and development of managerial skills as well as technologies. Thus, a training role for pilot-scale facilities is worthy of public sector consideration.

79-001656 Sadoglu, P. A BREEDING METHOD FOR BIINE /ASTYANAX MEXICANUS/ BASED ON ANNUAL SPAWNING PATTERNS. Copeia 1979 (2): 369-371. 18 May 1979. SFA 24(3)

[Cell. Dev. Biol., Dep. Biol., State Univ. N.Y. Stony Brook, NY 11794]

79-001657 Saha, G. N.; Raman, K.; Chatterjee, D. K.; Ghosh, S. R. RELATIVE RESPONSE OF THREE NITROGENOUS FERTILIZERS IN DIFFERENT POND SOILS IN RELATION TO PRIMARY PRODUCTIVITY, PLANKTON AND SURVIVAL AND GROWTH OF /LABEO ROHITA/ SPAWN. J. Inland Fish. Soc. India 7: 162-172. Dec. 1975. SFA 24(3)

The response of urea, ammonium sulphate and ammonium nitrate on equivalent nitrogen basis at 3 different rates (20, 50 and 80 kg N/ha) on 4 types of soil ranging between moderately acid and alkaline reaction as reflected in primary productivity, plankton production and survival and growth of /labeo rohita/ spawn, was studied under laboratory and yard conditions. The response of all the fertilizers with regard to survival of spawn, as compared to control, was significant at 1 percent level and among the fertilizers the same was significant at 1 percent and 5 percent levels in the 3 soils (slightly acid to alkaline reaction) with low nitrogen status. The response was, however, non-significant in moderately acid soil with high nitrogen level. The results thus indicate that higher fish production can be achieved by manuring the ponds with the right type of nitrogenous fertilizers, /viz./, urea in slightly acidic to neutral soil and ammonium sulphate in alkaline soil.

79-001658 Smitherman, R. O.; El-Ibiary, H. M.; Reagan, R. E., (eds.) GENETICS AND BREEDING OF CHANNEL CATFISH. U.S. Dep. Agric. South. Coop. Ser. Bull. 223. 34p. Oct. 1978. Available from Ala. Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830. SFA 24(3)

MARICULTURE

79-001659 Ansuini, F. J.; Huguenin, J. E. THE DESIGN AND DEVELOPMENT OF A FOULING RESISTANT MARINE FISH CAGE SYSTEM. Proc. Annu. Meeting World Maricult. Soc. 9: 737-745. 1978. SFA 24(3)
[Kennecott Copper Corp., 128 Spring Street, Lexington, MA 02173] A prototype low-maintenance modular marine cage-culture system for commercial use has been developed and is presently in service at Maine Salmon Farms, Wiscasset, Maine. The basic component of the cage system is a 1 x 3 m fiberglass frame covered with 90/10 copper-nickel expanded-metal mesh of 76 percent open area. These panels are interconnected along with other fiberglass structurals, fittings and modular float units to form a 57 m^3 rigid, floating cage system. The modular design allows this concept to be readily adapted to larger size floating cages, as well as submerged or bottom mounted applications. The excellent engineering properties of 90/10 copper-nickel, coupled with its inherent resistance to biofouling, are the keys to the projected long, useful service life and low maintenance requirements. Design details, performance specifications and economic analysis, for both the prototype and larger future nested commercial systems, are provided.

79-001660 Borgese, E. M. A NET OF CONNECTED MESHES: SEA FARMING AROUND THE WORLD. Oceans 12 (2): 9-15. Mar.-Apr. 1979. SFA 24(3)

79-001661 Branch, M. R.; Strawn, K. BRACKISH WATER POND POLYCULTURE OF ESTUARINE FISHES IN THERMAL EFFLUENT. Proc. Annu. Meeting World Maricult. Soc. 9: 345-356. 1978. SFA 24(3)
[Dep. Wildl. Fish. Sci., Tex. A&M Univ., College Station 77843] Three species of fish were cultured in 0.1 ha ponds from August 1976 to May 1977. Each pond received a constant flow of thermal effluent. Striped mullet (/Mugil cephalus/) were maintained in polyculture with black drum (/Pogonias cromis/) and Atlantic croaker (/Micropogon undulatus/). These fish were also raised in monoculture. Survival of mullet in polyculture with drum averaged 91.8 percent; in polyculture with croaker, 96.4 percent; in monoculture, 96.8 percent. Black drum survival averaged 95.5 percent in polyculture and 96.3 percent in monoculture. Croaker survived slightly better in monoculture at 39.3 percent compared to 33.5 percent in polyculture with mullet. Growth of all species was improved in polyculture. Competition values indicated that daily yield of mullet and black drum was increased 30 percent and 20 percent respectively through polyculture. Growth of croaker was largely unaffected by addition of mullet into the system, but mullet growth was raised 78 percent through this association. Thermal additions to these ponds proved critical when seasonal growth trends were examined.

79-001662 Brasola, V.; Kalfa, A. M.; Cannas, A. ESPERIENZE POSITIVE DI RIPRODUZIONE ARTIFICIALE DI /MUGIL CEPHALUS/ (L.) EFFETTUATE NELLA LAGUNA DI ORBETELLO. [A POSITIVE RESULT OF ARTIFICIAL REPRODUCTION IN /MUGIL CEPHALUS/ (L.) OBTAINED AT THE LAGOON OF ORBETELLO.] Riv. It. Piscic. Ittiop. 14 (1): 15-20. Jan.-Feb.-Mar. 1979. In Italian with English summ. SFA 24(3)
[Cent. Ittiogenico, 58010 Santa Liberata, Grosetto, Italy]

79-001663 Cuyvers, L. HERDING SEA BREAM. Oceans 12 (2): 21-23. Mar.-Apr. 1979. SFA 24(3)
[Coll. Mar. Sci., Univ. Del., Newark]

79-001664 Hirose, K.; Machida, Y.; Donaldson, E. M. INDUCED OVULATION OF JAPANESE FLOUNDER (/LIMANDA YOKOHAMAE/) WITH HUMAN CHORIONIC GONADOTROPIN AND SALMON GONADOTROPIN, WITH SPECIAL REFERENCE TO CHANGES IN QUALITY OF EGGS RETAINED IN THE OVARIAN CAVITY AFTER OVULATION. Bull. Jpn. Soc. Sci. Fish. 45 (1): 31-36. Jan. 1979. SFA 24(3)
[Arasaki Mar. Biol. Stn., Arasaki, Nagai, Yokosuka 238-03, Japan]
This study was undertaken to determine the effects of delay between ovulation and stripping on egg quality in the Japanese flounder. Post-ovulatory eggs were divided into two categories. Eggs in stage I were normal, whereas those in stage II were over-ripened and observed to be 3 to 5 days after ovulation. In HCG-treated fish the percentages of successful fertilization and hatching indicated were maximal one day after ovulation, followed by a rapid decrease, whereas in SG-G100-treated fish the fertilization rate was maximal 2 days after ovulation, followed by a more gradual decrease. It is shown that flounder eggs remain in good condition for 2 or 3 days depending upon the type of hormone used to induce ovulation. Changes in body weight, water and sodium contents of the eggs are discussed in relation to the over-ripening phenomenon.

79-001665 Hoff, F. H.; Pulver, T.; Mountain, J. CONDITIONING FLORIDA POMPANO (/TRACHINOTUS CAROLINUS/) FOR CONTINUOUS SPAWNING. Proc. Annu. Meeting World Mariculr. Soc. 9: 299-309. 1978. SFA 24(3)
[Instant Ocean Hatcheries, Inc., Rt. 2, Box 86, Dade City, FL 33525]
A series of 3 temperature and light conditioning experiments was conducted on pompano during the fall and winter of 1971 and 1972 to stimulate gonadal development to a prespawning condition during non-breeding seasons. Two experimental parameters were designed from field data and compressed to 5:1, or 3:1 (normal to experimental day). A third experiment used constant temperature/light regime. Gonadal development was checked routinely by in vivo sampling. Use of habitat to stimulate more natural conditions neither enhanced or deterred gonadal development. In changing regimes, 50 percent or more individuals were in prespawning condition by the 11th or 12th week. While under constant conditions 11 to 45 percent were ready at each sampling. Food consumption in regard to habitat and temperature was considered. Disease, infections and injuries usually occurred during, or just after, the colder portion of the regime and/or during periods of low pH.

79-001666 Hoff, F. H.; Mountain, J.; Frakes, T.; Halcott, K. SPAWNING, OOCYTE DEVELOPMENT AND LARVAE REARING OF THE FLORIDA POMPANO (/TRACHINOTUS CAROLINUS/). Proc. Annu. Meeting World Mariculr. Soc. 9: 279-297. 1978. SFA 24(3)
[Instant Ocean Hatcheries, Inc., Rt. 2, Box 86, Dade City, FL 33525]
Twenty-five spawning attempts on the most reproductively developed fish were conducted on conditioned and unconditioned Florida pompano (/Trachinotus carolinus/). Human chorionic gonadotropin (HCG) was used to stimulate ovarian development. Dosage levels of .55 IU/g and .275 IU/g were usually administered 24 to 48 hours apart. Strip spawning and semi-natural spawning were used. Spawning occurred 7 to 208 hours after initial injection depending on initial oocyte size. Optimum oocyte size (580-718 u) produced spawning in 30-40 hours. A close correlation exists between rate of fertilization and oocyte growth during the first 16-25 hours. Fertilized eggs may shrink as much as 16

79-001666 CONTINUED
percent within one hour after fertilization. Two successive batches of pompano were reared to juvenile stage in 23 days. Larvae were fed a mixed diet of natural plankton (66 u mesh net), protozoans, rotifers (/Brachionus plicatilus/) and copepod nauplii (/Oithona/ sp.). Water was initially conditioned with 40 liters of dense algae (/Dunaliella/ sp. and /Tetraselmis/ sp.). Water quality was controlled by partial exchanges from a 40,000-liter biologically filtered system. Eighteen-hour lighting was used. Larvae developed edema at 8-10 days and, combined with low aeration, reduced survival to only 300 juveniles.

79-001667 Kirk, R. G. MARINE FISH AND SHELLFISH CULTURE IN THE MEMBER STATES OF THE EUROPEAN ECONOMIC COMMUNITY. Aquaculture 16 (2): 95-122. Feb. 1979. SFA 24(3)
[Comm. European Communities, Rue de la Loi 200, 1049 Brussels, Belguim] Re-population of stocks by the mass release of fish species into the North Sea is briefly discussed in the light of recent evidence on the behaviour and physiology of artificially cultured populations. The rearing of marine fish, crustaceans and molluscs in the EEC member states is then described with particular reference to the more economically important species. It is considered that, although a number of international and national organisations are already concerned with the practical application of mariculture techniques in Europe, the Community itself has an important part to play in the promotion of marine fish and shellfish rearing, especially in those regions of the EEC where there are few other alternatives for development.

79-001668 Perry, W. G. BRACKISH WATER POND CULTURE EXPERIMENTS WITH ATLANTIC CROAKER, STRIPED MULLET, CHANNEL CATFISH, AND RAINBOW TROUT. Proc. World Maricult. Soc. 6: 309-319. 1975. SFA 24(3)
[La. Wildl. Fish. Comm., Grand Chenier 70643] Brackish water pond culture studies have been conducted by the Louisiana Wildlife and Fisheries Commission at the Rockefeller Wildlife Refuge, Grand Chenier, Louisiana, since 1966. Atlantic croaker (/Micropogon undulatus/) and striped mullet (/Mugil cephalus/) were among the first species stocked. Various stocking rates and sizes have been tested to determine production without supplemental feed. Polyculture experiments were conducted with striped mullet-channel catfish (/Ictalurus punctatus/) combinations and striped mullet-Atlantic croaker combinations. Growth data for Atlantic croaker were highly variable; however, striped mullet results were promising, especially for polyculture with catfish. Results from two winter stockings of rainbow trout (/Salmo gairdneri/) indicate that warmer temperatures and marginal water quality may limit rainbow trout production in southwest Louisiana.

79-001669 Popper, D.; Pitt, R.; Zohar, Y. EXPERIMENTS ON THE PROPAGATION OF RED SEA SIGANIDS AND SOME NOTES ON THEIR REPRODUCTION IN NATURE. Aquaculture 16 (2): 177-181. Feb. 1979. SFA 24(3)
[c/o Fisheries, P.O. Box 295, Apia, Western Samoa] Experiments to propagate siganids in Flat in 1977 included hormonal (HCG) injections and larval rearing of three common species: /Siganus rivulatus/, /Siganus luridus/ and /Siganus argenteus/. Results show that HCG injections help to bring about spawning in all three species. Experiments to rear the larvae resulted in survival of a small number of /S. rivulatus/ in one of the tanks.

79-001670 Roberts, D. E., Jr.; Harpster, B. V.; Henderson, G. E. CONDITIONING AND INDUCED SPAWNING OF THE RED DRUM (/SCIAENOPS OCELLATA/) UNDER VARIED CONDITIONS OF PHOTOPERIOD AND TEMPERATURE. Proc. Annu. Meeting World Maricult. Soc. 9: 311-332. 1978. SFA 24(3)

[Fla. Dep. Nat. Resour. Mar. Res. Lab., 100 8th Ave. SE, St. Petersburg 33701] Vitellogenesis, culminating in spawning, was artificially induced in red drum (/Sciaenops ocellata/) using photoperiod and temperature as exogenous stimuli. Maturation was induced out of season during the normal refractory period of red drum found in central Florida waters. Four regimes were compared to a control. Three regimes culminated in advanced vitellogenesis and spawning. A semi-natural regime induced spawning in 129 days, an abbreviated decelerating regime induced spawning in 83 days, and an abbreviated accelerating/decelerating regime induced spawning in 117 days. Functional maturity of females was defined by analysis of vitellogenic stage frequency and oocyte diameter frequency. Ovarian biopsies were taken by catheter at 30-day intervals during experiment I, and 60-day intervals during experiment II. For a 90-day period in 1976, 4 females spawned 8.43 million eggs. For a 100-day period in 1977, 8 females spawned 4.41 million eggs. Fertilization success was always greater than 99 percent and mean hatching success was 93.40 percent for all spawns.

79-001671 Roberts, D. E., Jr.; Morey, L. A. III; Henderson, G. E.; Halscott, K. R. THE EFFECTS OF DELAYED FEEDING, STOCKING DENSITY, AND FOOD DENSITY ON SURVIVAL, GROWTH, AND PRODUCTION OF LARVAL RED DRUM (/SCIAENOPS OCELLATA/). Proc. Annu. Meeting World Maricult. Soc. 9: 333-343. 1978. SFA 24(3)

[Fla. Dep. Nat. Resour. Mar. Res. Lab., 100 8th Ave. SE, St. Petersburg 33701] The starvation time, optimal initial feeding time, stocking density, and food density were defined for larval red drum (/Sciaenops ocellata/) in 20- and 40-liter tanks. When larvae were not offered food by the fourth day after eye pigmentation (fifth day from hatching), they experienced 100 percent mortality. The optimal initial feeding time for best survival (14 percent) was the second day after eye pigmentation. Growth and survival were affected by initial embryo stocking density and food density maintained in the tank. Stocking densities of 2, 10, and 20 embryos/liter and food densities of one, 5 and 10 rotifers/ml were tested in 40-liter tanks. Survival and total biomass were higher when embryos were stocked at 10 embryos/liter and significantly higher when fed at 5 rotifers/ml. Growth was best when embryos were stocked at 2 embryos/liter.

79-001672 Tatum, W. M.; Trimble, W. C. MONOCULTURE AND POLYCULTURE POND STUDIES WITH POMPANO (/TRACHINOTUS CAROLINUS/) AND PENAEID SHRIMP (/PENAEUS AZTECUS/, /P. DUORARUM/, AND /P. SETIFERUS/) IN ALABAMA, 1975-1977. Proc. Annu. Meeting World Maricult. Soc. 9: 433-446. 1978. SFA 24(3)

[Ala. Dep. Conserv. Nat. Resour., P.O. Drawer 458, Gulf Shores 36542] Studies were conducted seasonally from 1975-1977 in 0.08 ha, brackish water ponds at the Claude Peteet Mariculture Center on monoculture of Florida pompano (/Trachinotus carolinus/), brown shrimp (/Penaeus aztecus/), and white shrimp (/P. setiferus/), and on polyculture of pompano with pink (/P. duorarum/) or brown shrimp. Three methods of stocking polyculture ponds were investigated. Pompano production from monoculture ponds managed seasonally for 95 to 191 days averaged 564 kg/ha with mean survival of 42 percent, mean feed conversion of 3.0, and mean weight of 156 g. During one growing season in 1977, consecutive 75- to 81-day crops of brown and white shrimp produced mean yields of 349 and 600 kg/ha, survivals of 69 and 96 percent, feed conversions of 4.0 and 2.3, and weights averaging 8.3

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and 10.0 g, respectively. The optimal method of stocking polyculture ponds with pompano and shrimp produced mean yields of 593 and 222 kg/ha, survivals of 30 and 53 percent, feed conversion of 2.6, and weights averaging 185 and 13.5 g, respectively. Although one season's highest yield (949 kg/ha, mean) was from 2 successive crops of penaieds and the maximum yield of pompano (760 kg/ha) was in monoculture, polyculture of shrimp and pompano demonstrated both technical and economical potential.

79-001673 Teng, S.-K.; Chua, T.-E. USE OF ARTIFICIAL HIDES TO INCREASE THE STOCKING DENSITY AND PRODUCTION OF ESTUARY GROUPER, /EPINEPHELUS SALMOIDES/ MAXWELL, REARED IN FLOATING NET CAGES. Aquaculture 16 (3): 219-232. Mar. 1979. SFA 24(3)
[Sch. Biol. Sci., Univ. Sains Malaysia, Penang, Malaysia] The relative growth and production of estuary grouper, /Epinephelus salmoides/, in response to seven combinations of hiding space and stocking density were studied in floating net cages. Used car tyres were suspended in the net cages to provide hiding space for the fish. The seven combinations of hiding space and stocking density were as follows: Hiding space (cm^3/fish): 0 116 181 222 251 272 289 + Stocking density (fish/m^3): 60 84 108 132 156 180 204. Provision of hiding space in the net cages was found to permit an increase in the stocking density from the optimal rate of 60 fish/m^3 (without artificial hides) to 156 fish/m^3. The net production was found to increase from 8.5 kg/m^3 to 19.5 kg/m^3 after 3 months. Growth in terms of weight gain per fish, survival rate and food conversion ratio at stocking rates below 156 fish/m^3 with hiding space between 116 and 222 cm^3/fish was comparable to that observed at the optimal stocking density without hiding space (60 fish/m^3). The growth of fish stocked at 180-204 fish/m^3 with hiding space of 272-289 cm^3/fish, respectively, was found to be significantly depressed. Thus, with the provision of hiding space of 251 cm^3/fish, the stocking density could be increased to as high as 156 fish/m^3 and the production of fish could be increased by 230 percent over that at the usual optimal stocking rate of 60 fish/m^3 without artificial hides.

79-001674 Zaitsev, V. SOVIET SEA FARM SYNOPSIS. Oceans 12 (2): 20. Mar.-Apr. 1979. SFA 24(3)

FEEDS, FEEDING AND NUTRITION

79-001675 Andrews, J. W. SOME EFFECTS OF FEEDING RATE ON GROWTH, FEED CONVERSION AND NUTRIENT ABSORPTION OF CHANNEL CATFISH. Aquaculture 16 (3): 243-246. Mar. 1979. SFA 24(3)
[Univ. Ga. Coll. Agric., Coastal Plain Stn., P.O. Box 13687, Savannah 31406] In an 8-week trial, 300-g channel catfish (/Ictalurus punctatus/) were fed at five feeding rates: a control group which was fed at a rate that approximated the ad libitum rate for this size fish, and four groups which were fed at 110, 90, 75 and 50 percent of the control rate. Significant decreases in growth and feed conversion (feed/gain) rates were obtained in treatments fed 110 percent of the control rate. Water quality monitoring indicated that this reduction in performance was not due to poorer water quality. Gains were not significantly affected by feeding 90 percent of the control level, but were reduced in the 75 and 50 percent treatments. Food efficiencies were improved by reduction of the feeding rate to 90 and 75 percent of the control level, but were not further improved at the 50 percent feeding level. Total absorbability and digestible energy values for

79-001675 CONTINUED
the test diet were improved by restricting the rate to 90 percent of the control, but protein absorbability was not affected.

79-001676 Bengtson, D. A.; Beck, A. D.; Poston, H. A. COMPARATIVE EFFECTS OF LIVE AND ARTIFICIAL DIETS ON GROWTH AND SURVIVAL OF JUVENILE ATLANTIC SILVERSIDE, /MENIDIA MENIDIA/. Proc. Annu. Meeting World Maricult. Soc. 9: 159-173. 1978. SFA 24(3)
[U.S. EPA, Environ. Res. Lab., Narragansett, RI 02882] Juvenile Atlantic silversides (/Menidia menidia/) were fed a live diet of 3-day-old brine shrimp nauplii (/Artemia salina/). Growth and survival of those fish is compared with that of fish fed various artificial diets, those fed live food and an artificial diet on alternate days, and one group not fed. Survival on the live /Artemia/ diet was 93 percent of the original 150 fish after 24 days. Artificial diets gave survival ranging from 43 percent to 79 percent during the same period. Fish fed live and artificial diets had 88 percent survival. The unfed group had 10 percent survival after 9 days and all died after 16 days of starvation. Growth was best on the live diet and only slightly less, but significantly different, on the combination diet. Growth was significantly less on all the artificial diets. No artificial diet yet tested, including the World Mariculture Society Nutrition Task Force invertebrate reference diet (preliminary), has provided survival and growth of Atlantic silversides equivalent to that of fish fed live brine shrimp nauplii. Relative success of the combination diet demonstrates partial nutritional requirements can be derived from an artificial (non-living) food source and indicates progress toward adequate artificial diets for marine fishes.

79-001677 Bhanot, K. K.; Gopalakrishnan, V. PRIORITIES IN NUTRITIONAL RESEARCH FOR FORMULATING ARTIFICIAL FEEDS FOR FISHES. J. Inland Fish. Soc. India 5: 162-170. Dec. 1973. SFA 24(3)

79-001678 Bhattacharyya, M.; Harris, L.; Windell, J. T.; Buddington, R. K. PROXIMATE ANALYSIS AND THE COEFFICIENT OF DIGESTIBILITY OF FISH FOOD INGREDIENTS. J. Colo.-Wyo. Acad. Sci. 11 (1): 10. Apr. 1979. Abstract only. SFA 24(3)
[Colo. Div. Wildl., Fort Collins] The purpose of this study was to evaluate selected potential fish food ingredients by proximate analysis, relative digestibility and available metabolizable energy. Proximate analysis included determination of wet, dry, ash and organic weight, protein, fat, fiber and calorific equivalent of commercially prepared and marketed cottonseed meal and whole egg yolk protein. The ingredients were individually mixed with chromic oxide, pelleted and fed to rainbow trout, /Salmo gairdneri/. Fecal samples were collected by the analsuction method. A coefficient of digestibility and the metabolizable energy was calculated for each nutrient following proximate and nutrient analysis of the pellet and fecal samples.

79-001679 Bischoff, U.; Windell, J. T. EFFECTS OF TEMPERATURE ON DIGESTIVE EFFICIENCY AND SATIATION OF /SALMO GAIRDNERI/. J. Colo.-Wyo. Acad. Sci. 11 (1): 13. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder] The purpose of this study was to observe the effect of temperature on the digestive efficiency and the amount of food required for satiation of rainbow trout (/Salmo gairdneri/). A comparison was made between the digestive efficiency with and without satiation at water temperatures of 7, 11, and 15°C. A 3 x 3 factorial design was utilized whereby one-half of the fish in each trough were studied for satiation and efficiency and the remaining for efficiency without satiation. All fish were fed the Colorado Regular diet

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containing chromic oxide, fasted for 72 hours, then fed again according to the standard feeding chart. Fecal samples were collected by anal suction 24 hours after feeding, dried and prepared for chromic oxide and nutrient analysis. Digestion coefficients were calculated for crude protein, lipid and energy. Satiation was determined by the weight of food consumed during timed intervals.

79-001680 Brandenburg, A. M.; Ray, M. S.; Lewis, W. M. USE OF CARP EGGS AS A FEED FOR FINGERLING LARGEMOUTH BASS. Prog. Fish-Cult. 41 (2): 97-98. Apr. 1979. SFA 24(3)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

79-001681 Buddington, R. K. DIGESTIBILITY REFERENCES PRESENT IN NATURAL FOODS OF FISH. J. Colo.-Wyo. Acad. Sci. 11 (1): 11. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder] A laboratory study was conducted to investigate the digestibility of several components present in natural foods of fish. Trout (/Salmo gairdneri/) and four species of tilapia (/T. aurea/, /T. mossambica/, /T. nilotica/, /T. zillii/) were chosen as experimental fish. The Colorado Standard Diet with cellulose, chitin and Cr(2)O(3) (chromic oxide) added was used as the experimental feed. Feces were siphoned daily, dried, ground and analyzed. Chromic oxide was used as a reference to which all other components were compared. Due to indigestibility, certain food components can be used as dietary indicators. Therefore, digestive efficiency of fish in the field can now be determined.

79-001682 Chakrabarty, R. D.; Sen, P. R.; Chatterjee, D. K.; Kowtal, G. V. OBSERVATIONS ON THE RELATIVE USEFULNESS OF DIFFERENT FEED FOR CARP SPAWN AND FRY. J. Inland Fish. Soc. India 5: 182-188. Dec. 1973. SFA 24(3)

79-001683 Chakrabarty, R. D.; Kar, S. L. PRELIMINARY OBSERVATIONS ON THE UTILITY OF PETROLEUM PROTEIN AS FEED FOR CARP SPAWN AND FRY. J. Inland Fish. Soc. India 7: 116-119. Dec. 1975. SFA 24(3)

79-001684 Choubert, G., Jr.; de la Noue, J.; Luquet, P. CONTINUOUS QUANTITATIVE AUTOMATIC COLLECTOR FOR FISH FECES. Prog. Fish-Cult. 41 (2): 64-67. Apr. 1979. SFA 24(3)
[Fish. Nutr. Lab., Hydrobiol. Res. Cent. I.N.R.A., Saint-Pee-sur-Nivelle, 64310 Ascain, France]

79-001685 Cowey, C. B.; Adron, J. W.; Hardy, R.; Smith, J. G. M.; Walton, M. J. UTILIZATION BY RAINBOW TROUT OF DIETS CONTAINING PARTIALLY RENDERED HIDE FLESHINGS. Aquaculture 16 (3): 199-209. Mar. 1979. SFA 24(3)
[N.E.R.C. Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen AB1 3RA, Scotland]

79-001686 Dominico, R. D.; Windell, J. T. MINERAL ABSORPTION EFFICIENCY BY RAINBOW TROUT, /SALMO GAIRDNERI/ AND /TILAPIA NILCTICA/. J. Colo.-Wyo. Acad. Sci. 11 (1): 11-12. Apr. 1979. Abstract only. SFA 24(3)

[Univ. Colo., Boulder] The purpose of this study was to estimate the absorption efficiency of the dietary mineral content in experimental diets fed to rainbow trout /Salmo gairdneri/ and /Tilapia nilotica/. Two 2 x 3 factorial experimental designs were used to compare the absorption efficiency of two body sizes of fish fed diets containing 3 percent, 5 percent and 7 percent mineral ash. Each diet and the resulting fecal output was subjected to nutrient proximate analysis. Fecal samples were collected by means of anal suction following several days of feeding on the experimental diets. Specific minerals in the food and feces were quantitatively measured by atomic absorption spectrophotometry. Preliminary results suggest very low absorption efficiency of dietary mineral content.

79-001687 Ghosh, A. N.; Mukhopadhyay, M. K.; Chatterjee, G. N. SUPPLEMENTARY FEEDING AS A TOOL FOR ENHANCED PRODUCTION IN MULLET CULTURE, /MUGIL PARSIA/ (HAM.). J. Inland Fish. Soc. India 7: 209-211. Dec. 1975. SFA 24(3)

In a series of field experiments conducted in 0.02 ha brackish water ponds at an uniform stocking density, it has been established that with increase in the protein contents in the supplementary food, the fish production can be increased. When supplied with 21.68 percent of protein of vegetable origin, the mullet, /Mugil parsia/ achieved an average growth of 125 mm/25 g in 180 days. In contrast, provision of 26.25 percent protein from vegetable and animal sources could bring the same growth in 140 days from an identically sized stocked fry of 17 mm. The respective productions for the period were estimated as 750/ha and 800/ha. In addition, the second type of food also increased the total fish protein as also flesh protein, by about 1.0 percent.

79-001688 Gulley, D. D.; Windell, J. T. THE BEHAVIOR OF CEROMIC OXIDE IN FISH ASSIMILATION AND DIGESTIBILITY STUDIES. J. Colo.-Wyo. Acad. Sci. 11 (1): 12. Apr. 1979. Abstract only. SFA 24(3)

[Univ. Colo., Boulder] The purpose of this study was to determine (1) if chromic oxide is a reliable inert marker for estimating assimilation efficiency and the coefficient of digestibility of fish food ingredients and multicomponent diets, (2) if major dietary constituents and chromic oxide move at the same rate through the digestive tract, and (3) if chromic oxide interferes with the absorption of the major dietary components. Yearling rainbow trout, /Salmo gairdneri/, were acclimated to 11°C water and fed the Colorado Regular diet (1/8" pellets) containing 1 percent chromic oxide (experimental groups). The control groups were fed the same diet without chromic oxide. Feces were collected by the anal suction method and all fish killed immediately. Proximate analyses were conducted on pooled subsamples of feces and samples removed from the stomach and intestine. It was concluded that the chromic oxide method was reliable for determining assimilation efficiency and the coefficient of digestibility of fish food ingredients and multicomponent diets.

79-001689 Higgs, D. A.; Eales, J. G. INFLUENCE OF DIET COMPOSITION ON RADIOTHYROXINE KINETICS IN BROOK TROUT, /SALVELINUS FONTINALIS/ (MITCHILL). Can. J. Zool. 57 (2): 396-402. Feb. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

79-001690 Hilge, V. MOEGLICHER EINFLUSS VERSCHIEDENER, KOMBINIERTER PROTEIN- UND FETTGEHALTE DES FUTTERS AUF DAS GONADENWACHSTUM JUNGER SPIEGELKARPFEN (/CYPRINUS CARPIO L./). [POSSIBLE INFLUENCES OF DIFFERENT, COMBINED PROTEIN AND FAT LEVELS OF THE FEED ON THE GONADAL GROWTH OF YOUNG MIRROR CARP (/CYPRINUS CARPIO/ L.).] Arch. Fischereiwiss. 29 (3): 113-118. Mar. 1979. In German with English summ. SFA 24(3)
[Inst. Binnenfisch. Bundesforschungsanstalt Fisch., Hamburg, West Germany]

79-001691 John, M. J.; Mahajan, C. L. THE PHYSIOLOGICAL RESPONSE OF FISHES TO A DEFICIENCY OF CYANOCOBALAMIN AND FOLIC ACID. J. Fish Biol. 14 (2): 127-133. Feb. 1979. SFA 24(3)
[Dep. Zool., Univ. Rajasthan, Jaipur, India. PIN. 302004]

79-001692 Prasadam, R. D.; Gopinathan, K. EXPERIMENTAL STUDIES ON THE FOOD PREFERENCES AND THE EFFECT OF SUPPLEMENTARY FEEDS ON THE GROWTH AND SURVIVAL OF THE GREY-MULLETS /MUGIL MACROLEPIS/ SMITH. J. Inland Fish. Soc. India 8: 173-178. Dec. 1976. SFA 24(3)
Experiments on the food preferences and the effect of six supplementary diets on the growth and survival of the grey-mullet /Mugil macrolepis/ indicated that diets comprising a mixture of dried and powdered weeds, fish meal, prawn meal and tapioca were the most efficacious. The diet comprising a mixture of dried and powdered weeds, prawn meal and tapioca gave still better results when supplemented with natural food than when fed alone.

79-001693 Reinacher, E. WEITERE UNTERSUCHUNGEN ZUR FRAGE DER BEEINFLUSSUNG DER KONSUMQUALITAET VON TIEFGEFROERENEN FORELLEN DURCH DEN EINSATZ VON KRILLMEHL UND ANDEREN PROTEINTRAEGERN IN FISCHMEHLFREIEM FUTTER. [FURTHER INVESTIGATIONS ON THE QUESTION OF THE THE INFLUENCE OF FEED COMPOSITION ON EATING QUALITY OF DEEP-FROZEN RAINBOW TROUT USING KRILL MEAL AND OTHER PROTEIN SOURCES IN DIETS FREE OF FISH MEAL.] Arch. Fischereiwiss. 29 (3): 129-132. Mar. 1979. In German with English summ. SFA 24(3)
[Inst. Biochem. Technol. Bundesforschungsanstalt Fisch., Hamburg, West Germany]

79-001694 Sakamoto, S.; Yone, Y. AVAILABILITIES OF THREE IRON COMPOUNDS AS DIETARY IRON SOURCES FOR RED SEA BREAM. Bull. Jpn. Soc. Sci. Fish. 45 (2): 231-235. Feb. 1979. SFA 24(3)
[Fish. Res. Lab., Kyushu Univ., Tsuyozaki, Fukucka, 811-33, Japan]

79-001695 Sakamoto, S.; Yone, Y. REQUIREMENT OF RED SEA BREAM FOR DIETARY MG. Bull. Jpn. Soc. Sci. Fish. 45 (1): 57-60. Jan. 1979. SFA 24(3)
[Fish. Res. Lab., Kyushu Univ., Tsuyazaki, Fukuoka, 811-33 Japan]

79-001696 Sanchez Muniz, F. J.; de la Higuera, M.; Mataix, F. J.; Varela, G. THE YEAST /HANSENULA ANOMALA/ AS A PROTEIN SOURCE FOR RAINBOW TROUT (/SALMO GAIRDNERI/). HEMATOLOGICAL ASPECTS. Comp. Biochem. Physiol. A Comp. Physicl. 63 (1): 153-157. 1979. SFA 24(3)
[Dep. Fisiol. Anim., Fac. Farm., Univ. Complutense de Madrid, Spain]

79-001697 Schauer, P. S.; Simpson, K. L. EFFECTS OF DIETS ON THE FATTY ACID COMPOSITION OF JUVENILE ATLANTIC SILVERSIDES (/MENIDIA MENIDIA/). Proc. Annu. Meeting World Maricult. Soc. 9: 175-187. 1978. SFA 24(3)
[Dep. Food Sci. Technol. Nutr. Diet., Univ. R.I., Kingston 02881]

79-001698 Sehgal, K. L.; Wani, A. R.; Nabi, G.; Kumar, K. EXPERIMENTS ON THE EFFICIENCY AND COST OF DRY, COMPOUND PELLETIZED FEED IN RELATION TO CONVENTIONAL FEED IN KASHMIR TROUT FARM. J. Inland Fish. Soc. India 8: 1-12. Dec. 1976. SFA 24(3)

79-001699 Sehgal, K. L.; Joshi, C. B. PRELIMINARY OBSERVATIONS ON IMPROVED TECHNIQUES OF ARTIFICIAL FEEDING OF BROWN (/SALMO TRUTTA FARIO/) AND RAINBOW (/SALMO GAIRDNERI/) TROUTS IN KASHMIR TO CONTROL 'WHIRLING' ASSOCIATED WITH MALNUTRITION. Indian J. Anim. Sci. 45 (6): 404-411. June 1975. SFA 24(3)

79-001700 Viola, S.; Amidan, G. THE EFFECTS OF DIFFERENT DIETARY OIL SUPPLEMENTS ON THE COMPOSITION OF CARP'S BODY FAT. Bamidgeh 30 (4): 104-109. Dec. 1978. SFA 24(3)
[Miloubar-Central Feedmill, D.N. Ashrat, Israel] One hundred carp of 300 g. weight, stocked in mesh cages of 1 m^3 capacity, were fed commercial pellets supplemented with 5 percent different oils of animals or plant origin. The pattern of the body fatty acids of carp was found to be distinctly different from those of trout and catfish, raised on similar commercial pellets. The characteristic basic pattern of the carp's body fatty acids was modified by the 5 percent dietary oils to resemble the pattern of the dietary oils. Cottonseed soapstock raised the ratio of unsatured (linoleic) to saturated (stearic) acids far more than did crude cottonseed oil. This was probably due to reduction of the cyclopropencic acid content during the drastic process of soapstock production.

79-001701 Wankowski, J. W. J.; Thorpe, J. E. THE ROLE OF FOOD PARTICLE SIZE IN THE GROWTH OF JUVENILE ATLANTIC SALMON (/SALMO SALAR/ L.). J. Fish Biol. 14 (4): 351-370. Apr. 1979. SFA 24(3)
[J. E. Thorpe: Dep. Agric. Fish. Scotland, Freshwater Fish. Lab., Faskally, Pitlochry, Perthshire, Scotland] The effect of particle size of a commercial pelleted feed on the growth of Atlantic salmon from first feeding alevins to first and second year smolts was investigated using 20-day feeding experiments. Ten experiments were performed over a two year period, each comprising six groups of fish separately selected from stock populations. Each group was presented with one of six sizes of food particle ranging from larger than the respective mean mouth breadth (100 percent feed size), through 50

79-001701 CONTINUED
percent, 25 percent, 12.5 percent, 6.25 percent to 3.125 percent. Experiments were performed in six radial flow/circumferential drain tanks under ambient photoperiod and water temperature. Growth rate was found to be closely related to feed size. Maximum growth in each case was shown only on one size of particle; larger and smaller sizes resulted in reduced growth. The particle size for maximum growth increased in direct proportion to fish length. Fish from 4.2 to 20.3 cm in length showed maximum growth on particle diameters 0.022 to 0.026 x fish fork length (FFR). First feeding alevins were found to show comparable growth rate on particle diameters 0.0115 to 0.090 FFR. Some seasonal variation in growth response was indicated. The results are discussed in relation to developmental and seasonal effects. Possible factors affecting the energetics of prey size related differential growth are discussed.

79-001702 Windell, J. T.; Beaudry, J. M.; Foltz, J. W. GROWTH RATE OF RAINBOW TROUT (/SALMO GAIRDNERI/) FED A TILAPIA (/SARCTHERODON MOSSAMBICUS/) FISH MEAL SUPPLEMENTED DIET. J. Colo.-Wyo. Acad. Sci. 11 (1): 12. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder] The proximate nutrient composition of /Sarotherodon mossambicus/ (Tilapia) was determined in a 2 x 2 factorial comparison of the whole body of large and small male and female fish. Large male fish with the fillet removed were also analyzed. Analyses included determination of protein, fat, ash, moisture, organic matter and calorific content. Kilocalories per gram of dry matter were similar for all groups (4.76 Kcal/g) except large female fish which were 5.26 Kcal/g. It was concluded that Tilapia filleting scrap and whole body fish would make a suitable fish meal similar to currently marketed fish meal. An experimental diet containing Tilapia meal was formulated, pelleted and fed to rainbow trout for 10 weeks. Growth performance was compared to a standard control diet containing herring meal. experimental and control fish groups attained 1.5 conversion factor. Analysis of covariance indicated that trout fed the Tilapia meal-substituded diet grew at the same rate as trout fed the herring meal diet (control).

79-001703 Windell, J. T.; Harris, I.; Horak, D. I. METABOLIZABLE ENERGY ABSORPTION EFFICIENCY AND THE COEFFICIENT DIGESTIBILITY OF FISH FOOD INGREDIENTS AND DIETS. J. Colo.-Wyo. Acad. Sci. 11 (1): 10. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder] The purpose of this study was to review published and unpublished studies on the coefficient of digestibility, absorption efficiency and metabolizable energy values of fish food ingredients and diets. The published information included 101 literature citations containing 250 coefficient of digestibility values and 56 metabolizable energy values. Data have been recalculated for the remaining 194 digestibility values to determine metabolizable energy values by estimating the energy cost of feces and urine. The calculated values are intended to replace existing values derived from experiments with chickens and should receive widespread use in practical fish diet formulation.

TRANSPORTING FISH

79-001704 Gupta, M. V.; Sharma, B. K. A NOTE ON THE TRANSPORT OF CHINESE CARP BREEDERS USING MS 222. J. Inland Fish. Soc. India 6: 99-100. Dec. 1974. SFA 24(3)

79-001705 Kulkarni, C. V.; Ogale, S. N. AIR TRANSPORT OF MAHSEER (PISCES: CYPRINIDAE) EGGS IN MOIST COTTON WOOL. Aquaculture 16 (4): 367-368. Apr. 1979. SFA 24(3)
[Fish Farm, Tata Elec. Co., Lonaola 410401, India] A method of transporting by air live eggs of /Tor khudree/ (Sykes), packed in moist cotton wool, is described. Egg mortality after transport was 8 percent or less and survival after hatching was 75 percent.

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT

79-001706 Bhanot, K. K.; Vass, K. K. MASS REARING OF /DAPHNIA CARINATA/ KING IN THE FIELD. J. Inland Fish. Soc. India 8: 145-148. Dec. 1976. SFA 24(3)

79-001707 Blair, A.; Burgess, W. H. ROTATING, FLOATING CAGE FOR FISH CULTURE SIMPLIFIES CLEANING AND REPLACEMENT OF PANELS. Prog. Fish-Cult. 41 (2): 74-76. Apr. 1979. SFA 24(3)
[Natl. Environ. Res. Counc., Inst. Mar. Biochem., Aberdeen AB1 3RA, Scotland]

79-001708 Coleman, D. E. CHAMBER FOR CULTURING MICROORGANISMS. Prog. Fish-Cult. 41 (2): 110. Apr. 1979. SFA 24(3)
[Dep. Anim. Sci., Univ. Hawaii, Honolulu 96822]

79-001709 Hulata, G.; Rothbard, S. COLD STORAGE OF CARP SEMEN FOR SHORT PERIODS. Aquaculture 16 (3): 267-269. Mar. 1979. SFA 24(3)
[Agric. Res. Organ.,Inst. Anim. Sci., Fish Aquacult. Res. Stn., Dor, Israel] Semen of common carp may be stored for periods of up to 45 h by cooling to temperatures between 0 and 5°C. No differences in fertilisation or hatching were found when eggs were fertilised with either cold-stored or fresh semen. Use of semen stored for short periods enables the separation in time between semen and egg collection. This may facilitate propagation of fish in hatcheries.

79-001710 Saha, C.; Gopalakrishnan, V. CONSTRUCTION OF FISH PONDS. J. Inland Fish. Soc. India 6: 122-130. Dec. 1974. SFA 24(3)

79-001711 Sinha, V. R. P. A SIMPLE METHOD OF FRACTIONATION OF FISH PITUITARY GONADOTROPIN. J. Inland Fish. Soc. India 6: 150-154. Dec. 1974. SFA 24(3)

GENERAL LIMNOLOGY AND OCEANOGRAPHY

79-001712 Schelske, C. L. ROLE OF PHOSPHORUS IN GREAT LAKES EUTROPHICATION: IS THERE A CONTROVERSY? J. Fish Res. Board Can. 36 (3): 286-288. Mar. 1979. In English with French summ. SFA 24(3)

79-001713 Serruya, C. , (ed.) LAKE KINNERET. Monogr. Biol. 32. xii + 501p. 1978. SFA 24(3)
[Kinneret Limnol. Lab., Tiberias, Israel]

PHYSICAL LIMNOLOGY AND OCEANOGRAPHY

79-001714 Williams, J. D. H.; Pashley, A. E. LIGHTWEIGHT CORER DESIGNED FOR SAMPLING VERY SOFT SEDIMENTS. J. Fish. Res. Board Can. 36 (3): 241-246. Mar. 1979. In English with French summ. SFA 24(3)
[Can. Cent. Inland Waters, P.O. Box 5050, Burlington, ON L7R 4A6, Canada]

BENTHOS

79-001715 Anderson, N. H.; Cummins, K. W. INFLUENCES OF DIET ON THE LIFE HISTORIES OF AQUATIC INSECTS. J. Fish. Res. Board Can. 36 (3): 335-342. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Entomol., Oreg. State Univ., Corvallis 97331]

79-001716 Barton, D. R.; Wallace, R. R. EFFECTS OF ERODING OIL SAND AND PERIODIC FLOODING ON BENTHIC MACROINVERTEBRATE COMMUNITIES IN A BROWN-WATER STREAM IN NORTHEASTERN ALBERTA, CANADA. Can. J. Zool. 57 (3): 533-541. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Biol., Univ. Waterloo, Waterloo, ON N2L 3G1, Canada] The portion of the Steepbank River which cuts through the Athabasca oil sands deposit supported a less diverse benthic invertebrate community than did upstream areas. The variety and relative abundance of Plecoptera and Trichoptera were consistently lower in the area of oil sand exposure. As a substrate for benthic invertebrates, oil sand appears to be analogous to bedrock, supporting about 60 percent as many animals per unit area as adjacent rubble substrates. Burrowing and negative phototropic organisms were significantly less abundant on oil sand than on rubble. When high discharge of the Athabasca River flooded a riffle to form a pool near the mouth of the Steepbank, rheophilic forms, such as /Baetis/ and /Simulium/, were largely eliminated from the riffle and benthic standing stocks were reduced by about 50 percent. The invertebrate community recovered quickly after riffle conditions returned.

79-001717 Boyle, T. P. NEW FLOATING TRAP FOR CAPTURING AND PRESERVING EMERGING AQUATIC INSECTS. Prog. Fish-Cult. 41 (2): 108-109. Apr. 1979. SFA 24(3)
[U.S. FWS, Columbia Natl. Fish. Res. Lab., Columbia, MO 65201]

79-001718 Lehmkuhl, D. M. ENVIRONMENTAL DISTURBANCE AND LIFE HISTORIES: PRINCIPLES AND EXAMPLES. J. Fish. Res. Board Can. 36 (3): 329-334. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Biol., Univ. Saskatchewan, Saskatoon, SK S7N 0W0, Canada]

79-001719 Malley, D. F.; Reynolds, J. B. SAMPLING STRATEGIES AND LIFE HISTORY OF NON-INSECTAN FRESHWATER INVERTEBRATES. J. Fish. Res. Board Can. 36 (3): 311-318. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Oceans, Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

79-001720 Novotny, J. F. DIURNAL CHARACTERISTICS OF DRIFTING MACROINVERTEBRATES IN THE MISSOURI RIVER, 1976. Proc. S.D. Acad. Sci. 57: 144-153. 1978. SFA 24(3)
[U.S. FWS, North Cent. Reservoir Invest., Yankton, SD 57078]
Estimates of daytime and nighttime macroinvertebrate drift were compared for the same locations in the Missouri River in 1976. Densities of Ephemeroptera, Trichoptera, Chironomidae, miscellaneous aquatic insects, and terrestrial insects were usually higher during the night. Habitats located near the border of the main channel of the river contained significanly more macroinvertebrates during the nighttime than during the daytime. Usually more macroinvertebrates were collected during the night than during the day in the main channel of the river; overall, however, the differences between daytime and nighttime estimates were not significant. Most macroinvertebrate production takes place in /Aufwuchs/ communities located in habitats in or near the border of the main channel, and some of the organisms produced later become part of the drifting community.

79-001721 Oliver, D. R. CONTRIBUTION OF LIFE HISTORY INFORMATION TO TAXONOMY OF AQUATIC INSECTS. J. Fish. Res. Board Can. 36 (3): 318-321. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Agric., Res. Br., Biosyst. Res. Inst., Ottawa, ON K1A 0C6, Canada]

79-001722 Resh, V. H. SAMPLING VARIABILITY AND LIFE HISTORY FEATURES: BASIC CONSIDERATIONS IN THE DESIGN OF AQUATIC INSECT STUDIES. J. Fish. Res. Board Can. 36 (3): 290-311. Mar. 1979. In English with French summ. SFA 24(3)
[Div. Entomol. Parasitol., Univ. Calif., Berkeley 94720]

79-001723 Rosenberg, D. M. INTRODUTION: FRESHWATER BENTHIC INVERTEBRATE LIFE HISTORIES: CURRENT RESEARCH AND FUTURE NEEDS. J. Fish. Res. Board Can. 36 (3): 290. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Oceans, Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

79-001724 Tuberville, J. D. DRIFT NET ASSEMBLY FOR USE IN SHALLOW WATER. Prog. Fish-Cult. 41 (2): 96. Apr. 1979. SFA 24(3)
[TVA, Norris, TN 37828]

79-001725 Waters, T. F. BENTHIC LIFE HISTORIES: SUMMARY AND FUTURE NEEDS. J. Fish. Res. Board Can. 36 (3): 342-345. Mar. 1979. In English with French summ. SFA 24(3)
[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

79-001726 Watling, L. MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. CRUSTACEA: CUMACEA. NOAA Tech. Rep. NMFS Circ. 423. iii + 23p. Apr. 1979. SFA 24(3)
[Dep. Oceanogr., Ira C. Darling Cent., Univ. Me., Walpole 04573] This manual includes an introduction on the external and internal morphology, development, life history, ecology and distribution, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the 34 species of cumacean peracarid crustaceans occurring in waters shallower than 200 m from Nova Scotia to Chesapeake Bay.

PLANKTON

79-001727 Varley, J. D. VARIATIONS IN THE HORIZONTAL ABUNDANCE OF CERTAIN PLANKTON SPECIES IN FLAMING GORGE RESERVOIR. Utah State Div. Wildl. Resour. Publ. No. 75-6. 18p. 1979. Available from Utah State Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116. SFA 24(3)

MORPHOLOGY

79-001728 Al-Daham, N. K.; Bhatti, M. N. ANNUAL CHANGES IN THE OVARIAN ACTIVITY OF THE FRESHWATER TELEOST, /BARBUS LUTEUS/ (HECKEL) FROM SOUTHERN IRAQ. J. Fish Biol. 14 (4): 381-387. Apr. 1979. SFA 24(3)
[Dep. Fish. Mar. Resour., Univ. Basrah, Basrah, Iraq]

79-001729 Allen, L. G. LARVAL DEVELOPMENT OF /GOBIESOX RHESSODON/ (GOBIESOCIDAE) WITH NOTES ON THE LARVA OF /RIMICOLA MUSCARUM/. NOAA Fish. Bull. 77 (1): 300-304. Jan. 1979. SFA 24(3)
[Dep. Biol. Sci., Univ. South. Calif., Los Angeles 90007]

79-001730 Baker, J. M. LARVAL DEVELOPMENT OF THE GREENSIDE DARTER, /ETHEOSTOMA BLENNIOIDES NEWMANII/ (AGASSIZ). IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 70-91. 1979. SFA 24(3)
[Div. Water Resour., TVA, Norris, TN 37828]

79-001731 Barber, D. L.; Westermann, J. E. M.; Jensen, D. N. NEW OBSERVATIONS ON THE RODLET CELL (/RHABDOSPORA THELOHANI/) IN THE WHITE SUCKER /CATOSTOMUS COMMERSONI/ (LACEPEDE): LM AND EM STUDIES. J. Fish Biol. 14 (3): 277-284. Mar. 1979. SFA 24(3)

[Dep. Biol., McMaster Univ., Hamilton, ON L8S 4K1, Canada] Light and electron microscopic studies of the morphological features of immature and mature rodlet cells in /Catostomus commersoni/ are presented emphasizing the cells' association with epithelial tissues. The peripheral fibrillar layer is lacking from the apex and from the base of the cell. A cytoplasmic extension from the base may be a feeding mechanism whereby the rodlet cell obtains nutrient at the expense of adjacent cells leaving intercellular spaces often containing myelin figures. RNAase digestion studies demonstrate the presence of RNA in the electron dense rodlet core. The structure and histochemistry of the rodlets which do not appear to disintegrate upon expulsion from the cell are compared to the cytoplasmic inclusions of both normal fish cells and protozoan parasites. The possible association of the rodlet cell with various pathological conditions is briefly reviewed and the authors conclude that it is premature to disregard the possibility that this cell could be a parasite or infective agent.

79-001732 Beecher, H. A. ANOMALOUS OCCURRENCE OF LIP PROJECTION ON /CARPIODES CYPRINUS/. Fla. Sci. 42 (1): 62-63. 1979. SFA 24(3)

[Oreg. Nat. Heritage Prog., 1234 N.W. 25th, Portland 97210] A median lip projection was found on 2 /Carpiodes cyprinus/ from the Apalachicola River, Florida.

79-001733 Bethe, M. L.; Krasnowski, P. V. STOCK SEPARATION STUDIES OF COOK INLET SOCKEYE SALMON BASED ON SCALE PATTERN ANALYSIS, 1977. Alaska Dep. Fish Game Inf. Leafl. No. 180. iii + 31p. Feb. 1979. SFA 24(3)

[Alaska Dep. Fish Game, Anchorage] The Statewide Salmon Stock Separation Project was initiated in July 1976 to research and apply new techniques of stock identification to mixed-stock salmon fisheries. During 1977 scales were collected from the sockeye escapements into the major systems of Upper Cook Inlet. Commercial catches were sampled at strategic locations. A projection microscope at 100x magnification was used to examine scales and measure numbers of circuli and widths of annual growth zones. Stock identification and classification of mixed-stock catch samples was based on pattern recognition procedures using discriminant function analysis of scale measurement data. The spatial and temporal distributions of the major sockeye stocks within the commercial fishery were partially identified. Application of stock identification techniques based upon scale pattern recognition to the mixed-stock upper Cook Inlet commercial salmon fishery is logistically and statistically feasible.

79-001734 Bhimasena Rao, J.; Karamchandani, S. J. ON THE SEXUAL DIMORPHISM OF A SILUROID FISH, /OMPOK BIMACULATUS/ (BLOCH), WITH PARTICULAR REFERENCE TO PECTORAL SPINE. J. Bombay Nat. Hist. Soc. 70 (2): 388-390. 1974. SFA 24(3)

79-001735 Dehadrai, P. V.; Banerji, S. R.; Thakur, N. K.; Das, N. K. SEXUAL DIMORPHISM IN CERTAIN AIR BREATHING TELECSTS. J. Inland Fish. Soc. India 5: 71-77. Dec. 1973. SFA 24(3)

79-001736 Dickson, D. H.; Collard, T. R. RETINAL DEVELOPMENT IN THE LAMPREY (/PETROMYZON MARINUS/ L.): PREMETAMORPHIC AMMOCOETE EYE. Am. J. Anat. 154 (3): 321-336. Mar. 1979. SFA 24(3)
[Dep. Anat., Sir Charles Tupper Med. Bldg., Dalhousie Univ., Halifax, NS B3H 4H7, Canada]

79-001737 Falcon, J. L'ORGANE PINEAL DU BROCHET (/ESOX LUCIUS/, L.). I. ETUDE ANATOMIQUE ET CYTOLOGIQUE. [THE PINEAL ORGAN OF THE PIKE, /ESOX LUCIUS/ L. I. A LIGHT AND ELECTRON MICROSCOPIC STUDY.] Ann. Biol. Anim. Biochim. Biophys. 19 (2): 445-465. 1979. In French with English summ. SFA 24(3)
[Max-Planck-Inst. Physiol. Klin. Forsch., W. G. Kerckhoff-Inst., Parkstrasse 1, 6350 Bad-Nauheim, West Germany]

79-001738 Fuiman, L. A. MATERIALS FOR A DESCRIPTION OF LAKE CHUBSUCKER, (/ERIMYZON SUCETTA/), LARVAE. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 92-99. 1979. SFA 24(3)
[Dep. Biol., Univ. Miss., University 38977] Twelve lake chubsucker larvae were compared with descriptions of creek chubsuckers at equal developmental phases. Preanal myomere distributions for the two species showed no overlap. Modal values were 27 and 31 for lake and creek chubsuckers, respectively. Eye diameter, expressed as percent of total length, for metalarvae was the only significant (0.05 probability level) morphometric value. Pigmentary differences were essentially non-existent. Morphological changes, such as cleithrum ossification and formation of dorsal fin lepidotrichia, occurred at smaller total lengths in lake chubsuckers. Characters used in a previously prepared key to separate creek chubsucker larvae from those of other genera were also useful for separation of lake chubsuckers from these groups.

79-001739 Graf, R.; Schluns, J. ULTRASTRUCTURAL AND HISTOCHEMICAL INVESTIGATION OF THE TERMINAL CAPILLARIES IN THE SPLEEN OF THE CARP (/CYPRINUS CARPIO/ L.). Cell Tissue Res. 196 (2): 289-306. 1979. SFA 24(3)
[Anat. Inst., Univ. Tubingen, Oesterbergstr., 3, D-7400 Tubingen 1, West Germany]

79-001740 Hughes, G. M. SCANNING ELECTRON MICROSCOPY OF THE RESPIRATORY SURFACES OF TROUT GILLS. J. Zool. (Lond.) 187 (4): 443-453. Apr. 1979. SFA 24(3)
[Res. Unit Comp. Anim. Respiration, Bristol Univ., Woodland Rd., Bristol, England]

79-001741 Ichikawa, M.; Ueda, K. ELECTRON MICROSCOPIC STUDY OF THE TERMINATION OF THE CENTRIFUGAL FIBERS IN THE GOLDFISH OLFACTORY BULB. Cell Tissue Res. 197 (2): 257-262. 1979. SFA 24(3)
[K. Ueda: Zool. Inst., Fac. Sci., Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan]

79-001742 Jilek, R. INTESTINAL HISTOLOGY OF /DOROSOMA CEPEDIANUM/. J. Fish Biol. 14 (2): 125-126. Feb. 1979. SFA 24(3)
[Dep. Zool., Ohio State Univ., Columbus 43210]

79-001743 Kemp, N. E.; Westrin, S. K. ULTRASTRUCTURE OF CALCIFIED CARTILAGE IN THE ENDOSKELETAL TESSERAE OF SHARKS. J. Morphol. 160 (1): 75-102. Apr. 1979. SFA 24(3)
[Dep. Exp. Biol., Univ. Mich., Ann Arbor 48109]

79-001744 Kranz, V. P.; Mueller, K. N.; Douglas, S. C. DEVELOPMENT OF THE YOUNG OF THE CREEK CHUB, /SEMOTILUS ATROMACULATUS/. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 100-119. 1979. SFA 24(3)
[NUS Corp., 236 S. Main St., Stillwater, MN 55082] The development of larval and juvenile creek chub, /Semotilus atromaculatus/, is described. The description is based on field collected specimens from the Chippewa River and Duschan Creek, a tributary, in west-central Wisconsin. Total myomere count, pigment patterns, and developmental phase transition lengths are the characters most useful in identifying young creek chub. The separation of young creek chub from other cyprinids is discussed.

79-001745 Lauder, G. V., Jr. FEEDING MECHANICS IN PRIMITIVE TELEOSTS AND IN THE HALECOMORPH FISH /AMIA CALVA/. J. Zool. (Lond.) 187 (4): 543-578. Apr. 1979. SFA 24(3)
[Mus. Comp. Zool., Harvard Univ., Cambridge, MA 02138]

79-001746 Lewis, S. V. THE MORPHOLOGY OF THE ACCESSORY AIR-BREATHING ORGANS OF THE CATFISH, /CLARIAS BATRACHUS/: A SEM STUDY. J. Fish Biol. 14 (2): 187-191. Feb. 1979. SFA 24(3)
[Dep. Zool., Univ. Malaya, Lembah Pantai, Kuala Lumpur, Malaysia]

79-001747 Liang, Y-S. [STUDY ON THE TAIWANIAN /CLARIAS/. 1. CLASSIFICATION; INTERRELATION AND SEASONAL VARIATION OF BODY LENGTH, BODY WEIGHT AND GONADS.] Rep. Inst. Fish. Biol. Minist. Econ. Aff. Natl. Taiwan Univ. 3 (3): 1-18. Aug. 1978. In Chinese with English summ. SFA 24(3)
[Inst. Fish. Biol., Natl. Taiwan Univ., Taipei, Taiwan]

79-001748 Luker, K. W. ORGANIZATION OF THE SUPRAMEDULLARY NEURON CLUSTER IN THE PUFFERFISH /TETRAODON/ SPS. Ph.D. dissertation, Univ. Calif. (Berkeley) 63p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):583. Aug. 1978. SFA 24(3)

79-001749 Markara, A. ZMENY POCTU ZIABROVYCH PAIICIEK U KARASA STRIEBRISTEHO [/CARASSIUS AURATUS/ (LINNAEUS, 1758)]. [CHANGES IN THE NUMBER OF GILL RAKERS IN /CARASSIUS AURATUS/ (LINNAEUS, 1758).] Biologia (Bratisl.) 34 (2): 151-159. 1979. In Czech with English summ. SFA 24(3)
[Dep. Poultry Small Farm Anim., Univ. Agric., 949 01 Nitra, Czechoslovakia]

79-001750 Meats, M.; Ingleton, P. M.; Jones, I. C.; Garland, H. O.; Kenyon, C. J. FINE STRUCTURE OF THE CORPUSCLES OF STANNIUS OF THE TROUT, /SALMO GAIRDNERI/: STRUCTURAL CHANGES IN RESPONSE TO INCREASED ENVIRONMENTAL SALINITY AND CALCIUM IONS. Gen. Comp. Endocrinol. 36 (4): 451-461. Dec. 1978. SFA 24(3)
[P. M. Ingleton: Dep. Zool., Univ. Sheffield, Sheffield S10 2TN, England]

79-001751 Menter, D. G.; Obika, M.; Tchen, T. T.; Taylor, J. D. LEUCOPHORES AND IRIDOPHORES OF /FUNDULUS HETEROCLITUS/: BIOPHYSICAL AND ULTRASTRUCTURAL PROPERTIES. J. Morphol. 160 (1): 103-120. Apr. 1979. SFA 24(3)
[Dep. Biol., Wayne State Univ., Detroit, MI 48202]

79-001752 Morrow, J. E. PRELIMINARY KEYS TO OTOLITHS OF SOME ADULT FISHES OF THE GULF OF ALASKA, BERING SEA, AND BEAUFORT SEA. NOAA Tech. Rep. NMFS Circ. 420. iii + 32p. Feb. 1979. SFA 24(3)
[P. O. Box 605, Port Orford, OR 97465] Keys and outline drawings are provided for the identification of the otoliths of 142 species of marine fishes from the Gulf of Alaska, Bering Sea, and Beaufort Sea.

79-001753 Murray, S. A.; Burton, C. B. EFFECTS OF DENSITY ON GOLDFISH BLOOD--II CELL MORPHOLOGY. Comp. Biochem. Physiol. A Comp. Physiol. 62 (3): 559-562. 1979. SFA 24(3)
[TVA, Muscle Shoals, AL 35660] Significant changes in morphology and distribution of red blood cells were observed in blood from adult goldfish held at two loading densities (0.80 and 4.19 fish cm/l water). Changes associated with fish held at high density included decreased counts of red blood cells and thrombocytes and an increase in lymphocytes and total leucocytes. Smaller red blood cells were also found in fish held at high density.

79-001754 Nakanishi, T. [COMPARISON OF COLOR PATTERN AND MERISTIC CHARACTERS AMONG THE THREE TYPES OF /CHAENOGOBIUS ANNULARIS/ GILL.] Bull. Fac. Fish. Hokkaido Univ. 29 (3): 223-232. Sept. 1978. In Japanese with English summ. SFA 24(3)
[Lab. Embryol. Genet., Fac., Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001755 Nicol, J. A. C. RETINAL RED PIGMENT IN THE PICKEREL (ESOCIDAE). Can. J. Zool. 57 (3): 693-696. Mar. 1979. In English with French summ. SFA 24(3)
[Univ. Tex., Port Aransas Mar. Lab., Port Aransas 78373]

79-001756 Nopanitaya, W.; Carson, J. L.; Grisham, J. W.; Aghajanian, J. G. NEW OBSERVATIONS ON THE FINE STRUCTURE OF THE LIVER IN GOLDFISH (/CARASSIUS AURATUS/). Cell Tissue Res. 196 (2): 249-261. 1979. SFA 24(3)
[Dep. Pathol., Sch. Med., Univ. N.C., Chapel Hill 27514]

79-001757 Orvig, T. MICROSTRUCTURE AND GROWTH OF THE DERMAL SKELETON IN FOSSIL ACTINOPTERYGIAN FISHES: /NEPHROTUS/ AND /COLOBODUS/, WITH REMARKS ON THE DENTITION IN OTHER FORMS. Zool. Scr. 7 (4): 297-326. 1978. SFA 24(3)
[Sect. Palaeozool., Swedish Mus. Nat. Hist., Stockholm, Sweden]

79-001758 Panasenko, V. A. TAXONOMIC CHARACTERS OF THE BREAM, /ABRAMIS BRAMA/, OF COURLAND LAGOON. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 138-142. 1978. SFA 24(3)
[AtlantNIRO, Kaliningrad, USSR] There is no sexual dimorphism in the Courland lagoon bream. No real differences in meristic characters are observed with the growth of the bream. Morphological characters change considerably with growth. As regard morphological characters the Courland lagoon bream is closest the bream subspecies living in the Aral and Caspian Seas. In Courland lagoon the bream has developed a distinctive ecological form.

79-001759 Radtke, R. L. THE FORMATION AND GROWTH OF OTOLITHS IN THE ESTUARINE FISH /FUNDULUS HETEROCLITUS/. Ph.D. dissertation, Univ. S.C. 57p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5190. May 1979. SFA 24(3)
The growth of the otolith of the mummichog, /Fundulus heteroclitus/ was studied under different conditions of photoperiod and temperature and in wild populations. The otoliths were examined by light and scanning electron microscopy. The photoperiod during incubation affected the number of increments formed in the embryo and larva. Temperature affected growth of the otolith but did not affect the number of increments and increments were formed before hatching. Length-frequency data of field collections 1 month apart indicated but one size class which had the same mean length. It is possible to estimate the hatching date of the fish with increment counts. When the data were adjusted for pre-hatching increments the results indicated that the spawning is cyclic and correlated with tidal and lunar cycles. Otolith increments could be used to resolve the cohorts of wild populations.--From abstr.

79-001760 Rahman, M. F.; Raghavan, S. L. RECORD OF A TAILLESS /CLARIAS BATRACHUS/ (LINNAEUS) FROM HEBBAL TANK. J. Inland Fish. Soc. India 8. Dec. 1976. SFA 24(3)

79-001761 Rana, A. K.; Ojha, J.; Datta Munshi, J. S. MORPHOMETRICS OF THE OLFACTORY ROSETTE IN RELATION TO BODY WEIGHT IN A FRESHWATER MURREL /CHANNA (=OPHIOCEPHALUS) PUNCTATUS/ (BLOCH). Arch. Biol. 89 (4): 403-417. 1978. SFA 24(3)
[P.G. Dep. Zool., Bhagalpur Univ., Bhagalpur 812007, Bihar, India]

79-001762 Richardson, S. L.; Laroche, W. A. DEVELOPMENT AND OCCURRENCE OF LARVAE AND JUVENILES OF THE ROCKFISHES /SEBASTES CRAMERI/, /SEBASTES PINNIGER/, AND /SEBASTES HELVOMACULATUS/ (FAMILY SCORPAENIDAE) OFF OREGON. NOAA Fish. Bull. 77 (1): 1-46. Jan. 1979. SFA 24(3)
[Gulf Coast Res. Lab., P.O. Drawer AG, Ocean Springs, MS 39564]

79-001763 Rizkalla, W.; Emsheri, O. THE PANCREAS OF THE MARINE TELEOST FISH, /LITHOGNATHUS MORMYRUS/ L., WITH SPECIAL REFERENCE TO ITS ISLET TISSUE. Libyan J. Sci. 8A: 1-20. 1978. SFA 24(3)
[Dep. Zool., Fac. Sci., Al-Faateh Univ., Tripoli, the Libyan Jamahiriya]

79-001764 Ross, L. G. THE HAEMODYNAMICS OF GAS RESORPTION FROM THE PHYSOCLIST SWIMBLADDER: THE STRUCTURE AND MORPHOMETRICS OF THE OVAL IN /POLLACHIUS VIRENS/ (L). J. Fish Biol. 14 (3): 261-266. Mar. 1979. SFA 24(3)
[Unit Aquatic Pathobiol., Univ. Stirling, Stirling FK9 4LA, Scotland] The structure of the oval in saithe is described with particular reference to its vascularisation. The extent of the capillary plexus was found to be greater than previously estimated, covering about 40 percent of the internal surface area of the bladder. Morphometric assessment of the capillary network enabled estimation of flow rate using the Poiseuille equation. The low potential flow suggested in this work may be a limiting factor in gas loss from the swimbladder and may place restraints on vertical migration.

79-001765 Sis, R. F.; Ives, P. J.; Jones, D. M.; Lewis, D. H.; Haensly, W. E. THE MICROSCOPIC ANATOMY OF THE OESOPHAGUS, STOMACH AND INTESTINE OF THE CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. J. Fish Biol. 14 (2): 179-186. Feb. 1979. SFA 24(3)
[P. J. Ives: Dep. Vet. Anat., Tex. A&M Univ., College Station 77843]

79-001766 Snyder, D. E. BURBOT-LARVAL EVIDENCE FOR MORE THAN ONE NORTH AMERICAN SPECIES. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 204-219. 1979. SFA 24(3)
[Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523] Historically, the burbot of North American had been described as more than one species, but by the latter part of the 19th century all, including the Eurasian burbot, were generally recognized as one circumpolar holarctic species. During the last few decades, the burbot has been considered by some authorities to exist as three subspecies: /Lota lota lota/ in Eurasia, /L. l. leptura/ in eastern Siberia and northwestern North America, and /L. l. lacustris/ (=/maculosa/) in central and northeastern North America. However, the more recent literature suggests that recognition of these subspecies may be unwarranted. Most systematic work to date has been restricted to adult forms, but we have dramatic evidence based on burbot larvae that, with further study, might lead to the recognition of more than one species, or subspecies, but not corresponding to the aforementioned subspecific designations. There appear to be two distinct larval forms. One is well pigmented with melanophores even as a late embryo and appears to be common to both Europe and North America. The other is without any melanophore pigmentation during the protolarval phase, except for the eyes and dorsal surface of the air bladder, and appears to be restricted to the lower Great Lakes and their tributaries.

79-001767 Snyder, D. E. MYOMERE AND VERTEBRA COUNTS OF THE NORTH AMERICAN CYPRINIDS AND CATOSTOMIDS. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 53-69. 1979. SFA 24(3)

[Dep. Fish. Wildl. Biol., Colo. State Univ., Fort Collins 80523]

Myomere counts, which are valuable in larval fish identification, have been reported for only about 20 percent of the North American cyprinids and catostomids. Since there is a nearly direct correlation between total myomeres and total vertebrae, the latter, which are known for many more species, can be used to approximate the former. The range of total vertebra and/or myomere counts for 70 cyprinid species, 28 to 51, is larger and essentially includes that for 27 catostomids, 32 to 52. Preanal and postanal myomere counts ranged from 19 to 31 and 10 (9?) to 18, respectively, for cyprinids and 25 to 42 and 5 (3?) to 12 (14?) for catostomids. The two families can be readily distinguished by the proportion of postanal to preanal myomeres, about 1/2 or greater for cyprinids and 1/3 or less for catostomids, or preanal to total myomeres, about 2/3 or less for cyprinids and 3/4 or more for catostomids. The genera of each family are characterized by distinctive ranges of total myomeres or vertebrae which can be used to help determine the identity of unknown cypriniform larvae.

79-001768 Spouge, J. I.; Larkin, P. A. A REASON FOR PLEOMERISM. J. Fish. Res. Board Can. 36 (3): 255-269. Mar. 1979. In English with French summ. SFA 24(3)

[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

79-001769 Srivastava, S.; Prakash Rai, B.; Swarup, K. HISTOMORPHOLOGY OF THE TINCTORIAL CELLS IN THE PITUITARY GLAND OF /CHANNA STRIATUS/ (BLOCH). Arch. Biol. 88 (1): 101-116. 1977. SFA 24(3)

[Dep. Zool., Univ. Gorakhpur, Gorakhpur, India]

79-001770 Steele, B. D. THE REPRODUCTIVE STRATEGY AND ENERGETICS OF ROSEFIN SHINERS, /NOTROPIS ARDENS/, IN BAREBONE CREEK, KENTUCKY. Ph.D. dissertation, Univ. Louisville 113p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5219. May 1979. SFA 24(3)

Common shiners and rosefin shiners were the most common small fishes in Barebone Creek. Rosefin shiners averaged 1.25/m² throughout the study. Rosefin shiners in Barebone Creek were commensal spawners in the nests of longear sunfish. Shiner larvae made up to 85 percent of the larvae collected from longear sunfish nests. This behavior is quite different from that reported by other authors, where rosefin shiners build and spawn in their own nests. There were four age groups present and the rosefin shiners matured at age II. Numbers of ova ranged from 168 to 1,139 and were correlated with the size of the fish. Food consisted primarily of terrestrial insects, although a few larval fishes were eaten. Total production of the rosefin shiner population in Barebone Creek was 1.38 g/m² or 13.8 kg/ha/yr. A comparison of energy budgets for female rosefin shiners in Barebone Creek and Brashears Creek showed that Brashears Creek females had a consistently higher total biocontent throughout their life span. An age III female from Brashears Creek had a total biocontent of 4,067 cal while an age III female from Barebone Creek had 2,525 cal. Most of this difference could be attributed to a high carcass lipid content (1,915 cal for Brashears Creek and 746 cal for Barebone Creek). Energy allocated for reproduction was comparable throughout the life spans in

79-001770 CONTINUED
both streams. Two possible theories are expressed for the evolution of commensal spawning in rosefin shiners in Barebone Creek: 1) that it resulted from accidental placement of eggs by rosefin shiners and 2) that the behavior resulted from intense competition among male rosefin shiners for a limited number of suitable nesting sites.--From abstr.

79-001771 Sumida, B. Y.; Ahlstrom, E. H.; Moser, H. G. EARLY DEVELOPMENT OF SEVEN FLATFISHES OF THE EASTERN NORTH PACIFIC WITH HEAVILY PIGMENTED LARVAE (PISCES, PLEURONECTIFORMES). NOAA Fish. Bull. 77 (1): 105-145. Jan. 1979. SFA 24(3)
[NMFS, P.O. Box 271, La Jolla, CA 92038]

79-001772 Terlou, M.; Ekengren, E. NUCLEUS PRAEOPTICUS AND NUCLEUS LATERALIS TUBERIS OF /SAIMO SALAR/ AND /SALMO GAIRDNERI/: STRUCTURE AND RELATIONSHIP TO THE HYPOPHYSIS. Cell Tissue Res. 197 (1): 1-21. 1979. SFA 24(3)
[Zool. Lab., Transitorium 3, Padualaan 8, Utrecht, The Netherlands]

79-001773 Wargo, A. A. LIGHT AND ELECTRON MICROSCOPE STUDIES OF CHANGES IN GASTRIC TISSUES OF THE CHANNEL CATFISH, /ICTALURUS PUNCTATUS/ (RAFINESQUE), AS RELATED TO FEEDING TIMES. Ph.D. dissertation, Georgetown Univ. 273p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5199. May 1979. SFA 24(3)

79-001774 Watson, A. D.; Cobb, J. L. S. A COMPARATIVE STUDY ON THE INNERVATION AND THE VASCULARIZATION OF THE /BULBUS ARTERIOSUS/ IN THE TELEOST FISH. Cell Tissue Res. 196 (2): 337-346. 1979. SFA 24(3)
[J. L. S. Cobb: Gatty Mar. Lab., The University, St. Andrews KY16 8LB, Scotland]

79-001775 Williams, J. D.; Howell, W. M. AN ALBINO SCULPIN FROM A CAVE IN THE NEW RIVER DRAINAGE OF WEST VIRGINIA (PISCES: COTTIDAE). Brimleyana no. 1. p. 141-146. Mar. 1979. SFA 24(3)
[U.S. FWS, Washington, DC 20240] An albino Banded sculpin, /Cottus carolinae/, with atypical morphological features, is reported from Buckeye Creek Cave, Greenbrier County, West Virginia. This is the first report of albinism in the genus. One atypical feature of the specimen is presence of a frenum, a structure unknown in any member of the family Cottidae. Other atypical features include enlargement of the cephalic canal pores and fusion of the postmandibular pores, and dorsal spine and pelvic fin ray counts that are unusual for a member of the /C. carolinae/ species group. The atypical features are described and compared with those of normally pigmented /C. carolinae/, which also occur in the cave.

PHYSIOLOGY

79-001776 Abrahamsson, T. AXONAL TRANSPORT OF ADRENALINE, NORADRENALINE AND PHENYLETHANOLAMINE-N-METHYL TRANSFERASE (PNMT) IN SYMPATHETIC NEURONS OF THE COD, /GADUS MORHUA/. Acta Physiol. Scand. 105 (3): 316-325. Mar. 1979. SFA 24(3)
[Dep. Zoophysiol., Univ. Goteborg, Sweden]

79-001777 Al-habbib, O. A. M.; Al-Habbib, W. M. S. ACCLIMATICN TO TEMPERATURE AND DEATH AT HIGH CHANGING LETEAL TEMPERATURES IN /CYPRINION MACRCSTCMUS/ (HECKEL). J. Therm. Biol. 4 (1): 75-77. Jan. 1979. SFA 24(3)
[Dep. Biol., Coll. Sci., Univ. Mosul, Mosul, Iraq]

79-001778 Alluchon-Gerard, M.-J. ELECTRON MICRCSCCPIC STUDY OF POST-THYROIDECTOMY CHANGES IN THE VENTRAL LOBE OF THE ADENCHYPOPHYSIS IN VERY YOUNG SPOTTED DOGFISH (/SCYLLIUM CANICULA/, CHONDRICHTHYES). Gen. Comp. Endocrinol. 36 (4): 585-597. Dec. 1978. In English with French summ. SFA 24(3)
[Lab. Biol. Anim., Cent. Rech. Biol. Biochim. Dev., Fac. Sci., 51100 Reims, France]

79-001779 Amthauer, R.; Krauskopf, M. STUDIES IN FISH LIVER PROTEIN SYNTHESIS--III. ACTIVITY OF CARP LIVER POLYRIBOSOMES IN AN HOMOLOGOUS CELL-FREE SYSTEM. Comp. Biochem. Physiol. B Comp. Biochem. 62 (3): 231-236. 1979. SFA 24(3)
[M. Krauskopf: Inst. Bioquim., Fac. Cienc., Univ. Austral Chile, Valdivia, Chile]

79-001780 Arunachalam, S.; Ravichandra Reddy, S. FOOD INTAKE, GROWTH, FOOD CONVERSION, AND BODY COMPOSITION OF CATFISH EXPOSED TO DIFFERENT SALINITIES. Aquaculture 16 (2): 163-171. Feb. 1979. SFA 24(3)
[Dep. Zool., Bangalore Univ., Bangalore 560001, India] The effects of different salinities (0, 2, 4, 6 and 10 °/oo) on food intake, growth, food conversion, and body composition of the freshwater catfish /Mystus vittatus/ (Bloch) were studied. Under a restricted feeding schedule daily intake of food was found to be salinity dependent. Fish reared in 10 °/oo consumed more /Tubifex tubifex/, converted less efficiently and displayed poor growth as compared to individuals reared in fresh water. Fish flesh production decreased from 483 g (fresh water) to 177 g (10 °/oo salinity) as the salinity was increased. Water content of the fish was found to decrease with increase in salinity, while maximum ash (25.56 percent) and fat (42.25 percent) were exhibited by fish reared in 10 °/oo salinity.

79-001781 Babiker, M. M.; Rankin, J. C. FACTORS REGULATING THE FUNCTIONING OF THE /IN VITRO/ PERFUSED AGLOMERULAR KIDNEY OF THE ANGLERFISH, /LOPHIUS PISCATORIUS/ L. Comp. Biochem. Physiol. A Comp. Physiol. 62 (4): 989-993. 1979. SFA 24(3)
[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd LL57 2UW, Wales]

79-001782 Babiker, M. M.; Rankin, J. C. RENAL AND VASCULAR EFFECTS OF NEUROHYPOPHYSIAL HORMONES IN THE AFRICAN LUNGFISH /PROTOPTERUS ANNECTENS/ (OWEN). Gen. Comp. Endocrinol. 37 (1): 26-34. Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Coll. North Wales, Bangor Gwynedd LL57 2UW, Wales]

79-001783 Babiker, M. M.; Rankin, J. C.; Eido, G. RENAL CLEARANCE, TISSUE DISTRIBUTION AND BINDING BY PLASMA PROTEINS OF ^{51}CR EDTA IN /TILAPIA NILOTICA/ (L.). Comp. Biochem. Physiol. A Comp. Physiol. 63 (1): 71-74. 1979. SFA 24(3)
[Dep. Zool., Univ. Khartoum, Sudan]

79-001784 Bagchi, M. M.; Ibrahim, K. H. A NOTE ON THE HAEMATOLOGICAL STUDY OF ROHU, /LABEO ROHITA/ (HAM.). J. Inland Fish. Soc. India 6: 93-94. Dec. 1974. SFA 24(3)

79-001785 Bartlett, G. R. PHOSPHATE COMPOUNDS IN RED CELLS, LIVER AND SKELETAL MUSCLE OF THE AMERICAN EEL, /ANGUILLA ROSTRATA/. Copeia 1979 (2): 360-363. 18 May 1979. SFA 24(3)
[Lab. Comp. Biochem., 4620 Santa Fe St., San Diego, CA 92109]

79-001786 Berge, J. A. THE PERCEPTION OF WEAK ELECTRIC A.C. CURRENTS BY THE EUROPEAN EEL, /ANGUILLA ANGUILLA/. Comp. Biochem. Physiol. A Comp. Physiol. 62 (4): 915-919. 1979. SFA 24(3)
[Inst. Mar. Biol. Limnol., Dep. Mar. Zool. Mar. Chem., Univ. Oslo, Norway]

79-001787 Bird, D. J.; Potter, I. C. METAMORPHOSIS IN THE PAIRED SPECIES OF LAMPREYS, /LAMPETRA FLUVIATILIS/ (L.) AND /LAMPETRA PLANERI/ (BLOCH). 2. QUANTITATIVE DATA FOR BODY PROPORTIONS, WEIGHTS, LENGTHS AND SEX RATIOS. Zool. J. Linn. Soc. 65 (2): 145-160. Feb. 1979. SFA 24(3)
[Sch. Environ. Life Sci., Murdoch Univ., Murdoch, West. Australia 6153, Australia]

79-001788 Bird, D. J.; Potter, I. C. METAMORPHOSIS IN THE PAIRED SPECIES OF LAMPREYS, /LAMPETRA FLUVIATILIS/ (L.) AND /LAMPETRA PLANERI/ (BLOCH). 1. A DESCRIPTION OF THE TIMING AND STAGES. Zool. J. Linn. Soc. 65 (2): 127-143. Feb. 1979. SFA 24(3)
[Sch. Environ. Life Sci., Murdoch Univ., Murdoch, West. Australia 6153, Australia]

79-001789 Blaxter, J. H. S.; Denton, E. J.; Gray, J. A. B. THE HERRING SWIMBLADDER AS A GAS RESERVOIR FOR THE ACOUSTICO-LATERALIS SYSTEM. J. Mar. Biol. Assoc. U.K. 59 (1): 1-10. Feb. 1979. SFA 24(3)
[Dunstaffnage Mar. Res. Lab., Oban, Scotland] The herring, /Clupea harengus/, in common with other clupeids, has ducts between the swimbladder and the exterior and has no apparent gas secretion organs. Experiments under pressure show that the central regions of the swimbladder wall are very compliant and collapse as the fish moves deeper in the sea, leaving the end sections patent. Gas is thus always held where it is available to maintain the gas-filled bulla system. The guanine plus hypoxanthine content of the swimbladder wall is high, averaging 0.86 mg cm^{-2} surface area in the central region and 2.70 mg cm^{-2} at the ends. This indicates that the swimbladder of the herring is unusually impermeable to gases. Analysis of the swimbladder gas shows that it could be air with some preferential loss of O(2) by diffusion. Gases other than the usual respiratory gases could not be found. Calculations show that, once filled, the gas in the swimbladder would be sufficient in volume to maintain full auditory function for several months.

79-001790 Boge, G.; Rigal, A.; Peres, G. A STUDY OF INTESTINAL ABSORPTION /IN VIVO/ AND /IN VITRO/ OF DIFFERENT CONCENTRATIONS OF GLYCINE BY THE RAINBOW TROUT (/SALMO GAIRDNERII/ RICHARDSON). Comp. Biochem. Physiol. A Comp. Physiol. 62 (4): 831-836. 1979. SFA 24(3)
[Lab. Mar. Physiol., Inst. Michel Pacha, 83500 Tamaris sur Mer, France]

79-001791 Bolis, L.; Fange, R. LIPID COMPOSITION OF THE ERYTHROCYTE MEMBRANE OF SOME MARINE FISH. Comp. Biochem. Physiol. B Comp. Biochem. 62 (4): 345-348. 1979. SFA 24(3)
[Ist. Fisiol. Gen., Univ. Messina, Italy]

79-001792 Bonnin, J.-P. VARIATIONS SAISONNIERES DE LA TESTOSTERONE PLASMATIQUE CHEZ UN POISSON TELEOSTEEN, /GOBIUS NIGER/ L. [SEASONAL VARIATIONS OF PLASMA TESTOSTERONE IN A TELEOST FISH, /GOBIUS NIGER/ L] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 288 (6): 627-630. 12 Feb. 1979. In French with English summ. SFA 24(3)
[Lab. Anat. Comp. Inst. Biol. Anim., Univ. Bordeaux-I, 33405 Talence Cedex, France]

79-001793 Bouck, G. R. HISTOCHEMISTRY OF LEUCINE AMINONAPHTHYLAMIDASE (LAN) IN RAINBOW TROUT (/SALMO GAIRDNERI/). Trans. Am. Fish. Soc. 108 (1): 57-62. Jan. 1979. SFA 24(3)
[U.S. FWS, Bldg. 204, Naval Support Activity, Seattle, WA 98115]

79-001794 Bouck, G. R.; Johnson, D. A. MEDICATION INHIBITS TOLERANCE TO SEAWATER IN COHO SALMON SMOLTS. Trans. Am. Fish. Soc. 108 (1): 63-66. Jan. 1979. SFA 24(3)
[U.S. FWS, Bldg. 204, Naval Support Activity, Seattle, WA 98115]

79-001795 Bouck, G. R.; Smith, S. D. MORTALITY OF EXPERIMENTALLY DESCALED SMOLTS OF COHO SALMON (/ONCORHYNCHUS KISUTCH/) IN FRESH AND SALT WATER. Trans. Am. Fish. Soc. 108 (1): 67-69. Jan. 1979. SFA 24(3)
[U.S. FWS, Bldg. 204, Naval Support Activity, Seattle, WA 98115]

79-001796 Burton, C. B.; Murray, S. A. EFFECTS OF DENSITY ON GOLDFISH BLOOD--I HEMATOLOGY. Comp. Biochem. Physiol. A Comp. Physiol. 62 (3): 555-558. 1979. SFA 24(3)
[TVA, Muscle Shoals, AL 35660] Adult goldfish were held at two loading densities (0.80 and 4.19 fish cm/l water) to determine the effects of density on hematology. Consistent decreases of hematocrit and hemoglobin concentrations, with an increase in erythrocyte sedimentation rate, were found to be related to density. A highly significant reduction in hemoglobin was associated with a high density of males. Density effects are apparently masked by fish size and sex. Density was found to have no effect on other hematological indices and plasma osmolality. These are discussed in the text.

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[Mar. Sci. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7 Canada]

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[Dep. Anat. Cell Biol., Fac. Health Sci., Univ. Ife, Ile-Ife, Nigeria]

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[U.S. FWS, 791 8th St., Jacoby Storehouse, Suite S, Arcata, CA 95521]

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[Biol. Fac., Moscow Univ., Moscow, USSR]

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[D. H. Whitmore: Dep. Biol., Univ. Tex., Arlington 79019] To evaluate physiological stress resulting from environmental influences, a haematological study of a natural population of largemouth bass, /Micropterus salmoides/, was undertaken to establish a 'normal' blood profile. Several parameters including haemoglobin concentration, haematocrit, erythrocyte count, mean corpuscular volume, mean corpuscular haemoglobin, mean corpuscular haemoglobin concentration, plasma protein concentration and glucose levels were investigated. Haematocrit, haemoglobin, and total plasma protein were positively correlated with fish length. Haemoglobin and haematocrit were positively correlated with fish age while mean corpuscular haemoglobin concentration was negatively correlated with fish age. Both haemoglobin and haematocrit values were related to erythrocyte counts.

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[Dep. Zoophysiol., Univ. Goteborg, Pack, S-400 33 Goteborg, Sweden]

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[Dep. Biol., Marquette Univ., Milwaukee, WI 53233]

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[Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

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[Dep. Zool., Biol. Sci. Cent., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

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[NMFS, Honolulu, HI 96812]

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[A. N. Severtsov Inst. Evol. Morphol. Anim. Ecol., Acad. Sci. USSR, Moscow, USSR]

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[Inst. Molec. Biol., Odense Univ., DK-5230 Odense, Denmark]

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[U.C.N.W. Mar. Sci. Lab., Menai Bridge, Ynys Mon, Gwynedd, Wales]

79-001813 Foltz, J. W. THE EFFECTS OF MEAL SIZE AND TEMPERATURE ON GASTRO-INTESTINAL MOTILITY AND ABSORPTION IN RAINBOW TROUT (/SALMO GAIRDNERI/) AND TILAPIA (/SAROTHERODON MOSSAMBICUS/). Ph.D. dissertation, Univ. Colo. 62p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(8):3607. Feb. 1979. SFA 24(3)
Complete gastric evacuation in trout acclimated at 7, 13 and 19 C required 49, 41, and 33 hours, respectively. Gastric evacuation in tilapia was not influenced by temperature and required 14 hours. Meal size influenced gastro-intestinal motility. Gastro-intestinal retention times of food residues for trout and tilapia decreased from 72 to 61 and from 69 to 51 hours, respectively, with increasing meal size. Absorption efficiency decreased from 49 to 44 percent and from 83 to 76 percent with increasing meal size in trout and tilapia, respectively. Decreased absorption efficiency was attributed to decreased gastro-intestinal retention times with increasing meal size. Absorption efficiency increased with increasing temperature in both species. Endogenous digestive substances produced by trout increased from 22 to 55 mg per fish with an increase in temperature from 7 to 19 C. Endogenous substances produced by tilapia increased from 26 to 67 mg with an increase in temperature from 19 to 31 C.--From abstr.

79-001814 Freadman, M. A. SWIMMING ENERGETICS OF STRIPED BASS AND BLUEFISH. Ph.D. dissertation, Univ. Mass. 113p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(8):3704. Feb. 1979. SFA 24(3)

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[Dep. Zool., Ariz. State Univ., Tempe 85281] The hypothesis was tested that the reproductive function would exhibit compensation to temperature if the organism was bred and reared at temperatures which ordinarily produced less than optimal reproductive performance. Desert pupfish, /Cyprinodon n. nevadensis/, were bred and the eggs reared at the optimum temperature for reproduction, 28 C, and at two marginal temperatures, 24 and 32 C. Each brood was divided into three groups and reproductive performance was tested at the rearing temperature and at two alternate temperatures to which they had never before been exposed. The eggs laid per spawning and eggs laid per gram weight per day showed no compensation to rearing temperature. Reproductive performance was optimal at 28 C and was poor at both marginal temperatures, regardless of the previous thermal history of the fish. Lower egg viability at 32 C was associated with a thin egg coat, small yolk diameter, and low gonosomatic index as compared with the same measurements at the lower temperatures.

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[Biol. Inst., Leningrad Univ., USSR]

79-001820 Gray, J. A. B.; Denton, E. J. THE MECHANICS OF THE CLUPEID ACOUSTICO-LATERALIS SYSTEM: LOW FREQUENCY MEASUREMENTS. J. Mar. Biol. Assoc. U.K. 59 (1): 11-26. Feb. 1979. SFA 24(3)
[Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

79-001821 Guderley, H. E.; Cardenas, J. M. DEVELOPMENTAL CHANGES IN THE PYRUVATE KINASE ISOZYMES OF COHO SALMON. J. Exp. Zool. 208 (1): 1-12. Apr. 1979. SFA 24(3)
[J. M. Cardenas: Dep. Chem., Univ. N.C., Chapel Hill 27514]

79-001822 Gulidov, M. V.; Popova, K. S. EFFECT OF TEMPERATURE ON THE SURVIVAL AND CERTAIN CHARACTERISTICS OF THE EMBRYONIC DEVELOPMENT OF THE KUTUM, /RUTILUS FRISII KUTUM/ (KAMENSKY). Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 242 (1-6): 464-466. Sept.-Oct. 1978. SFA 24(3)
[A. N. Severtsov Inst. Evol. Anim. Morphol. Ecol., Acad. Sci. USSR, Moscow, USSR]

79-001823 Gunnes, K. SURVIVAL AND DEVELOPMENT OF ATLANTIC SALMON EGGS AND FRY AT THREE DIFFERENT TEMPERATURES. Aquaculture 16 (3): 211-218. Mar. 1979. SFA 24(3)
[Dep. Anim. Genet. Breed., Agric. Univ. Norway, As-NLH, Norway]
Groups of Atlantic salmon (/Salmo salar/) eggs were incubated at 12, 10 and 8°C. At 12°C mortality was high and fry averaged little more than half the weight of those hatched at 10 or 8°C. Development of alevins to the 'swim-up' stage was also abnormal at 12°C. The results suggest that 10°C is optimal for incubating Atlantic salmon eggs. For the period between hatching and swim-up, the most favourable temperature varies according to the temperature used during incubation. Mortality rate during the first 6 weeks of feeding was correlated with mortality during earlier development. Total numbers of day-degrees required by the eggs and fry to reach the eyed, hatching, and swim-up stages of development were significantly less at 12°C than at 10 or 8°C. However, total day-degrees required to reach an average weight of 0.5 or 0.6 g were almost the same regardless of temperature during hatching.

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[Lab. Microbiol., Fac. Fish., Kagcshima Univ., Kagcshima 890, Japan]

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[Dep. Biol. Sci., Hunter Coll., Box 741, New York, NY 10021]

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[Dep. Zool., University College, Cork, Ireland]

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[Inst. Mar. Biol. Limnol., Univ. Cslo, Blindern, Cslo 3, Norway] The swimbladder in the sand goby, /Pomatoschistus minutus/, collected in shallow waters of the Oslcfjord, Norway, was studied. As the literature on swimbladders in gcbies appeared to be confusing, a short review of relevant literature has been made. Cn average, the volume of the swimbladder in the sand goby expressed as percentage of the body weight was fcund to be 4.7 percent in May and 2.5 percent in June. The significance of this volume variation is discussed.

79-001828 Hettler, W. F.; Cclby, D. R. ALTERATICN CF HEAT RESISTANCE OF ATLANTIC MENHADEN, /BREVOORTIA TYRANNUS/, BY PHOTOPERIOD. Comp. Biochem. Physicl. A Comp. Physicl. 63 (1): 141-143. 1979. SFA 24(3)
[NMFS, Beaufort Lab., Beaufort, NC 28516] Photoperiod, independent of acclimatien temperature, modified the upper thermal resistance of the temperate marine fish, /Brevoortia tyrannus/ (Latrobe). Juvenile /B. tyrannus/, acclimated to identical temperatures for 3 months to 8, 16 or 24 hr of light daily, were subjected to thermal shock. The median lethal time (ET50, in min) increased linearly as the daily light (hr) increased: ET50 = 31.24 + 2.79(hr) at 33.7°C.

79-001829 Hilbig, R.; Rahmann, H.; Rosner, P. BRAIN GANGLIOSIDES AND TEMPERATURE ADAPTATICN IN EURY- AND STENOTHERMIC TELEOST FISH (CARP AND RAINBOW TROUT). J. Therm. Biol. 4 (1): 29-34. Jan. 1979. SFA 24(3)
[Zool. Inst., Univ. Stuttgart-Hohenheim, 7000 Stuttgard 70 (Hohenheim), West Germany]

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[Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

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[Indiana Univ. Sch. Med., South Bend Cent., Notre Dame 46556]

79-001833 Holstein, B. GASTRIC ACID SECRETION AND WATER BALANCE IN THE MARINE TELEOST /GADUS MORHUA/. Acta Physiol. Scand. 105 (1): 93-107. Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Goteborg, Sweden]

79-001834 Honma, M.; Yamada, J. WATER MOVEMENT AND ALKALINE PHOSPHATASE ACTIVITY IN THE INTESTINE OF STICKLEBACKS ADAPTED TO SEAWATER OR FRESHWATER. Bull. Fac. Fish. Hokkaido Univ. 29 (2): 110-117. June 1978. SFA 24(3)
[Lab. Physiol. Ecol., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001835 Horiuchi, M.; Nakata, M.; Kohga, K. [A NEW CELL LINE FROM CARP SAC-FRY.] Bull. Jpn. Soc. Sci. Fish. 45 (2): 147-151. Feb. 1979. In Japanese with English summ. SFA 24(3)
[Nihon Nosan Kogyo Co. Ltd., Res. Cent., Midori-ku, Yokohama, Japan]

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79-001837 Houston, A. H.; Mearow, K. M. [^{14}C]PEG-4000, CHROMIDE, CHLORIDE/POTASSIUM AND SODIUM SPACES AS INDICATORS OF EXTRACELLULAR PHASE VOLUME IN THE TISSUES OF RAINBOW TROUT, /SALMO GAIRDNERI/ RICHARDSON. Comp. Biochem. Physiol. A Comp. Physiol. 62 (3): 747-751. 1979. SFA 24(3)
[Dep. Biol. Sci., Brock Univ., St. Catharines, ON L2S 3A1, Canada]

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[Dep. Biol. Sci., Brock Univ., St. Catharines, ON L2S 3A1, Canada]

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[Biophys. Unit, A.R.C. Inst. Anim. Physiol., Babraham CB2 4AT, England]

79-001840 Hughes, G. M.; Nyholm, K. VENTILATION IN RAINBOW TROUT (/SALMO GAIRDNERI/, RICHARDSON) WITH DAMAGED GILLS. J. Fish Biol. 14 (3): 285-288. Mar. 1979. SFA 24(3)
[Res. Unit Comp. Anim. Respiration, Univ. Bristol, Woodland Rd., Bristol BS8 1UG, England] An account is given of damage to the gills of trout which involved reduction in total filament length and consequently reduced respiratory surface area. It was noted that fish with the greatest gill damage tended to ventilate the gills by active swimming (ram ventilation) to a greater extent than those with more normal gills.

79-001841 Hughes, M. L.; Ikenberry, R. D. OXYGEN CONSUMPTION RATES OF SELECTED SPECIES OF FRESHWATER SCULPINS. J. Tenn. Acad. Sci. 54 (2): 71. Apr. 1979. Abstract only. SFA 24(3)
[Tusculum Coll., Greeneville, TN] A comparative study of oxygen consumption rates of two species of freshwater sculpins, /Cottus bairdi/ and /C. carolinae/ was performed at 10°, 15° and 20°. The sculpins were acclimated to experimental temperatures prior to testing. Oxygen consumption was measured by a modified open system respirometer with dissolved oxygen determinations accomplished by a micro-Winkler method. The overall oxygen consumption of /C. bairdi/ and /C. carolinae/ were not significantly different. Distinct differences in oxygen consumption as a function of body weight at the three temperatures were observed. The Q(10) values for both species approximated two. Opercular movements were significantly different between the two species at all temperatures. Physiological compensation in response to low oxygen tensions included both increased metabolic and ventilation rates. Death rates of the two species during acclimation indicate /C. bairdi/ has a lower thermal critical limit than /C. carolinae/.

79-001842 Hunt, D. W. C.; Eales, J. G. THE INFLUENCE OF TESTOSTERONE PROPIONATE ON THYROID FUNCTION OF IMMATURE RAINBOW TROUT, /SALMO GAIRDNERI/ RICHARDSON. Gen. Comp. Endocrinol. 37 (1): 115-121. Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Manitoba, Winnepeg, MB R3T 2N2, Canada]

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[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]

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[Sch. Biol. Sci., Bath Univ., Bath BA2 7AY, England]

79-001845 Idler, D. R.; Hwang, S. J. CONDITIONS FOR OPTIMIZING RECOVERY OF SALMON GONADOTROPIN ACTIVITY FROM CONA SEPHAROSE. Gen. Comp. Endocrinol. 36 (4): 642-644. Dec. 1978. SFA 24(3)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada] Several conditions for eluting salmon gonadotropin from ConA Sepharose were compared. The gonadotropin activity was measured by using radioimmunoassay and testicular phosphorus-33 uptake by 1-day-old chicks. The highest recovery of gonadotropin from ConA Sepharose was achieved by elution at room temperature with a buffer containing 50 percent (v/v) ethylene glycol.

79-001846 Idler, D. R.; Hwang, S. J.; Crim, L. W. QUANTIFICATION OF VITELLOGENIN IN ATLANTIC SALMON (/SALMO SALAR/) PLASMA BY RADIOIMMUNOASSAY. J. Fish. Res. Board Can. 36 (5): 574-578. May 1979. In English with French summ. SFA 24(3)
[Mar. Sci. Res. Lab., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

79-001847 Igram, R.; Wares, W. D. II OXYGEN CONSUMPTION IN THE FATHEAD MINNOW (/PIMEPHALES PROMELAS/ RAFINESQUE)--II EFFECTS OF PH, OSMOTIC PRESSURE, AND LIGHT LEVEL. Comp. Biochem. Physiol. A Comp. Physiol. 62 (4): 895-897. 1979. SFA 24(3)
[E. H. Studier: Dep. Biol., Univ. Mich.-Flint, Flint 48503] There is a curvilinear relationship between oxygen consumption (CC in $cm^3/g^{1.053}$ per hr) and pH, yielding the equation: $CC = -0.0612(pH)^2 + 1.0478(pH) - 4.051$. The relationship between CC and osmotic pressure (OP in mOsm/kg) for natural water is shown by the equation: $CC = 0.0091(OP)^2 - 0.0436(OP) + 0.208$, and that for NaCl treated water by: $CC = 0.0009(OP)^3 - 0.0208(OP)^2 + 0.104(OP) + 0.190$. A significant relationship was exhibited between oxygen consumption and light intensity (LI in W/m^2), producing the line given by: $CC = 0.0026(LI) + 0.336$.

79-001848 Iijima, N.; Zama, K. [INFLUENCE OF OXIDIZED LIPID ON THE LIPID METABOLISM IN THE FISH. I. CHANGES OF CARP ORGANO-LIPIDS CAUSED BY OXIDIZED LIPID INGESTION.] Bull. Fac. Fish. Hokkaido Univ. 29 (3): 282-290. Sept. 1978. In Japanese with English summ. SFA 24(3)
[Lab. Food Chem., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001849 Ince, B. W. METABOLIC EFFECTS OF PARTIAL PANCREATECTOMY IN THE NORTHERN PIKE, /ESOX LUCIUS/ L. J. Fish Biol. 14 (2): 193-198. Feb. 1979. SFA 24(3)
[Dep. Zool. Comp. Physiol., Queen Mary Coll., Univ. London, London E1 4NS, England]

79-001850 Ingram, G. A.; Alexander, J. B. THE IMMUNOGLOBULIN OF THE BROWN TROUT, /SALMO TRUTTA/ AND ITS CONCENTRATION IN THE SERUM OF ANTIGEN-STIMULATED AND NON-STIMULATED FISH. J. Fish Biol. 14 (3): 249-260. Mar. 1979. SFA 24(3)
[Dep. Biol., Gardner Street Annexe, Univ. Salford, Salford M6 6WZ, England]

79-001851 Iwata, K.; Kobashi, K.; Hase, J. [STUDIES ON MUSCLE ALKALINE PROTEASE--VII. EFFECT OF THE MUSCULAR ALKALINE PROTEASE AND PROTEIN FRACTIONS PURIFIED FROM WHITE CROAKER AND HORSE MACKEREL ON THE "HIMODORI" PHENOMENON DURING KAMABOKO PRODUCTION.] Bull. Jpn. Soc. Sci. Fish. 45 (2): 157-161. Feb. 1979. In Japanese with English summ. SFA 24(3)
[Fac. Pharm. Sci., Univ. Toyama, Gofuku, Toyama-Shi, 930 Japan]

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79-001914 Takahashi, K.; Cabling, F., Jr.; Zama, K. MOLECULAR SPECIES OF FISH MUSCLE LIPIDS. II. CHANGES IN TRIGLYCERIDE AND PHOSPHATIDYLCHOLINE MOLECULAR SPECIES OF SARDINE AFTER FROZEN STORAGE. Bull. Fac. Fish. Hokkaido Univ. 29 (4): 386-391. Nov. 1978. SFA 24(3)
[Lab. Food Chem. I, Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001915 Tandler, A.; Beamish, F. W. H. MECHANICAL AND BIOCHEMICAL COMPONENTS OF APPARENT SPECIFIC DYNAMIC ACTION IN LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/ LACEPEDE. J. Fish Biol. 14 (4): 343-350. Apr. 1979. SFA 24(3)
[Mar. Lab., Israel Oceanogr. Limnol. Res. Ltd., P.O. Box 1212, Elat, Israel] Apparent SDA was defined as the energy expenditure associated with the ingestion of a meal. In the present study apparent SDA was equated to an increase in oxygen consumption above the postabsorptive level subsequent to the ingestion of a meal. The energy cost for physically processing a meal, mechanical SDA, was equated to the oxygen uptake associated with the ingestion of non-digestible cellulose. The energy utilized by anabolic and catabolic processes associated with the ingestion of a standard diet was identified as biochemical SDA. Apparent, mechanical and biochemical SDA were each positively related to the energy intake of the standard diet. Apparent

79-001915 CONTINUED
SDA expressed relatively to energy ingested equalled 10.5 percent and was independent of the caloric content of the meal. Mechanical SDA increased asymptotically with ingested meal size and energy content. Relative to apparent SDA, mechanical SDA decreased with meal size, suggestive of an enhancement in efficiency. Biochemical SDA rose exponentially with increase in ingested energy, reflective of the cost for growth and catabolism.

79-001916 Targett, T. E. THE EFFECT OF TEMPERATURE AND BODY SIZE ON DIGESTIVE EFFICIENCY IN /FUNDULUS HETEROCLITUS/ (L.). J. Exp. Mar. Biol. Ecol. 38 (2): 179-186. 23 Apr. 1979. SFA 24(3)
[Dep. Zool. Univ. Me., Orono]

79-001917 Taylor, F. W. SERUM PROTEIN AND HEMOGLOBIN CHARACTERISTICS OF VARIOUS CATFISHES (/ICTALURUS/ SPP.) UNDER NORMAL AND DISEASED CONDITIONS. Ph.D. dissertation, Auburn Univ. 106p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):458. Aug. 1978. SFA 24(3)

79-001918 Thakur, N. K.; Pal, R. N.; Khan, H. A. EMBRYONIC AND LARVAL DEVELOPMENT OF /HETEROPNEUSTES FOSSILIS/ (BLOCH). J. Inland Fish. Soc. India 6: 33-44. Dec. 1974. SFA 24(3)

79-001919 Toerring, M. J.; Belbenoit, P. MOTOR PROGRAMMES AND ELECTRORECEPTION IN MORMYRID FISH. Behav. Ecol. Sociobiol. 4 (4): 369-379. 1979. SFA 24(3)
[Lab. Physiol. Nerv., Dep. Neurophysiol. Sens., C.N.R.S., F-91190 Gif-sur-Yvette, France]

79-001920 Tomasso, J. R.; Simco, B. A.; Davis, K. B. CHLORIDE INHIBITION OF NITRITE INDUCED METHEMOGLOBINEMIA IN CHANNEL CATFISH (/ICTALURUS PUNCTATUS/). J. Tenn. Acad. Sci. 54 (2): 71. Apr. 1979. Abstract only. SFA 24(3)
[Memphis State Univ., Memphis, TN]

79-001921 Torres, J. J.; Belman, B. W.; Childress, J. J. OXYGEN CONSUMPTION RATES OF MIDWATER FISHES AS A FUNCTION OF DEPTH OF OCCURRENCE. Deep-Sea Res. A Oceanogr. Res. Pap. 26 (2): 185-197. Feb. 1979. SFA 24(3)
[Mar. Sci. Inst., Univ. Calif., Santa Barbara 93106] Oxygen consumption was measured in 23 pelagic fish species whose minimum depth of occurrence range from zero to 1,000 m. Weight-specific respiratory rate declined rapidly with increasing minimum depth of occurrence. The decrease is partially due to environmental and compositional factors that covary with depth. Decreasing temperature accounts for 2 percent and the increased water content of deeper living species accounts for 30 percent of the observed decline. Other factors that might contribute to the decreasing oxygen consumption rate either had no significant effect (size, ash-free dry weight) or were considered to have small effects on the basis of existing evidence (pressure). The unexplained remainder of the decline appears to be an inherent characteristic of deeper living species that may be thought of as a decrease in aerobic metabolism per unit of muscle.

79-001922 Ueda, H.; Takahashi, H. CHANGES OF PITUITARY GONADOTROPHS ASSOCIATED WITH ARTIFICIAL MATURATION IN SILVER FEMALES OF THE JAPANESE EEL, /ANGUILLA JAPONICA/. Bull. Fac. Fish. Hokkaido Univ. 29 (4): 299-307. Nov. 1978. SFA 24(3)
[Lab. Fresh-Water Fish-Cult., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001923 Veith, W. J. THE CHEMICAL COMPOSITION OF THE FOLLICULAR FLUID OF THE VIVIPAROUS TELEOST /CLINUS SUPERCILIOSUS/. Comp. Biochem. Physicl. A Comp. Physiol. 63 (1): 37-40. 1979. SFA 24(3)
[Zool. Inst., Univ. Stellenbosch, Stellenbosch, 7600 South Africa]

79-001924 Verghese, P. U. INTERNAL RHYTHM OF SEXUAL CYCLE IN A CARP /CIRRHINA REBA/ (HAM.) UNDER ARTIFICIAL CONDITIONS OF DARKNESS. J. Inland Fish. Soc. India 7: 182-188. Dec. 1975. SFA 24(3)

79-001925 Vodicnik, M. J. THE ROLE OF VARIOUS ENVIRONMENTAL FACTORS AND THE PINEAL ORGAN ON THE PHYSIOLOGY OF TELEOST FISHES. Ph.D. dissertation, Marquette Univ. 194p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(9):4217. Mar. 1979. SFA 24(3)
Data suggest that the pineal can be either stimulatory or inhibitory to gonadal development depending on the photoperiod regime to which the animals are exposed. Specifically, the pineal is stimulatory under long, and inhibitory under short photoperiod conditions. The pineal apparently influences gonadal activity by modulating gonadotropin secretion. A diurnal variation in plasma gonadotropin levels was also observed in both sham operated and pinealectomized goldfish exposed to a long photoperiod-warm temperature regime in spring.

79-001926 Volkov, I. V. ON THE PHYSIOLOGY OF THE LEUKOCYTE SYSTEM OF /VIMBA VIMBA/ FROM NEMAN RIVER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 148-153. 1978. SFA 24(3)
[Petrozovodsk Univ., USSR]

79-001927 Voss, E. W., Jr.; Groberg, W. J., Jr.; Fryer, J. L. BINDING AFFINITY OF TETRAMERIC COHO SALMON IG ANTI-HAPTEN ANTIBODIES. Immunochemistry 15: 459-464. 1978. SFA 24(3)
[Dep. Microbiol., Univ. Ill., Urbana 61801]

79-001928 Walton, M. J.; Cowey, C. B. GLUCONEOGENESIS FROM SERINE IN RAINBOW TROUT /SALMO GAIRDNERI/ LIVER. Comp. Biochem. Physiol. B Comp. Biochem. 62 (4): 497-499. 1979. SFA 24(3)
[Inst. Mar. Biochem., St. Fittick's Rd., Aberdeen AB1 3RA, Scotland]

79-001929 Warren, L.; Buck, C. A.; Rabinowitz, J. L.; Sherman, I. W. ISOLATION AND CHARACTERIZATION OF THE ERYTHROCYTE SURFACE MEMBRANE OF THE SMOOTH DOGFISH, /MUSTELUS CANIS/. Comp. Biochem. Physiol. B Comp. Biochem. 62 (4): 471-479. 1979. SFA 24(3)
[Wistar Inst. Anat. Biol., 36th St. at Spruce, Philadelphia, PA 19104]

79-001930 Warren, M. L., Jr.; Wilson, J. L. WEIGHT LOSS DUE TO DEPRIVATION IN TWO SUBSPECIES OF LARGEMOUTH BASS. J. Tenn. Acad. Sci. 54 (2): 73. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Tenn., Knoxville] During a 123-day laboratory study, two subspecies of largemouth bass (/Micropterus salmoides salmoides/ and /M. s. floridanus/) were compared as to weight loss due to deprivation and weight gained subsequent to deprivation. Significant differences in rate of weight lost were determined between the subspecies; however, this difference was partially attributed to initial size differences between the subspecies. Although no differences were found in the total weight gained, both subspecies showed rapid gains in a relatively short period of time.

79-001931 Watson, A. H. D. FLUORESCENT HISTOCHEMISTRY OF THE TELEOST GUT: EVIDENCE FOR THE PRESENCE OF SEROTONERGIC NEURONES. Cell Tissue Res. 197 (1): 155-164. 1979. SFA 24(3)
[Gatty Mar. Lab., The University, St. Andrews KY16 8LB, Fife, Scotland]

79-001932 Wells, R. M. RESPIRATORY ADAPTATION AND ENERGY METABOLISM IN ANTARCTIC NOTOTHENIID FISHES. N. Z. J. Zool. 5 (4): 813-815. Dec. 1978. SFA 24(3)
[Dep. Zool., Univ. Auckland, Private Bag, Auckland, New Zealand]

79-001933 Wood, C. M.; McMahon, B. R.; McDonald, D. G. RESPIRATORY GAS EXCHANGE IN THE RESTING STARRY FLOUNDER, /PLATICHTHYS STELLATUS/: A COMPARISON WITH OTHER TELEOSTS. J. Exp. Biol. 78: 167-179. Feb. 1979. SFA 24(3)
[Dep. Biol., McMaster Univ., 1280 Main St. West, Hamilton, ON L8S 4K1, Canada] A wide range of respiratory, ventilatory, and cardiovascular parameters have been recorded under completely resting conditions in the starry flounder (/Platichthys stellatus/), a generally inactive benthic teleost. The results differ in a number of important respects from those of a previous study on the same species. The present data have also been compared with those reported for the active pelagic rainbow trout (/Salmo gairdneri/) and for other teleost species. Of particular note in the flounder, relative to the trout, are low arterial and venous P(O2)'s, a low arterial-venous O(2) content difference, a low transfer factor and high diffusion gradient for O(2) across the gills, a high /in vivo/ blood O(2) affinity, a high cardiac output and stroke volume accompanied by a low peripheral vascular resistance, a low ventilation volume, a low ventilation-perfusion ratio, and a low capacity-rate ratio for O(2) exchange at the gills. Parameters of CO(2) transport and acidbase regulation appear conventional, though blood CO(2) corterts and lactate concentrations are low. The respiratory strategies of inactive versus active, and benthic versus pelagic teleosts are discussed.

79-001934 Woodward, J. J.; Casillas, E.; Smith, I. S.; D'Aoust, B. G. RAPID DECOMPRESSION STRESS ACCELERATES FIBRINOLYSIS IN FINGERLING SALMON. J. Fish. res. Board Can. 36 (5): 592-594. May 1979. In English with French summ. SFA 24(3)
[Fish. Res. Inst., Univ. Wash., Seattle 98195]

79-001935 Yamane, S. HISTOLOGY AND FINE STRUCTURE OF THE ULTIMOBRANCHIAL GLAND IN THE ZEBRAFISH, /BRACHYDANIO RERIO/. Bull. Fac. Fish. Hokkaido Univ. 29 (3): 213-221. Sept. 1978. SFA 24(3)
[Lab. Physiol. Ecol., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-001936 Yamauchi, H.; Orimo, H.; Yamauchi, K.; Takano, K.; Takahashi, H. INCREASED CALCITONIN LEVELS DURING OVARIAN DEVELOPMENT IN THE EEL, /ANGUILLA JAPONICA/. Gen. Comp. Endocrinol. 36 (4): 526-529. Dec. 1978. SFA 24(3)
[Toyo Jozo Co. Ltd. Res. Lab., Chito, Shizuoka 410-23, Japan]

79-001937 Yanagawa, H. EMBRYONIC DEVELOPMENT AND FRY OF THE KYURIUO, /OSMERUS EPERLANUS MORDAX/ (MITCHILL). Bull. Fac. Fish. Hokkaido Univ. 29 (3): 195-198. Sept. 1978. SFA 24(3)
[Lab. Mar. Zool., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

GENETICS, VARIATION STUDIES AND HYBRIDIZATION

79-001938 Avtalion, R. R.; Hammerman, I. S. SEX DETERMINATION IN /SAROTHERODON/ (/TILAPIA/). I. INTRODUCTION TO A THEORY OF AUTOSOMAL INFLUENCE. Bamidgeh 30 (4): 110-115. Dec. 1978. SFA 24(3)
[Dep. Life Sci., Bar-ilan Univ., Ramat-Gan, Israel]

79-001939 Bulger, A. J. HETEROSIS AND THERMAL ADAPTATIONS IN DESERT FISHES. Ph.D. dissertation, Univ. Conn. 64p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5271. May 1979. SFA 24(3)

79-001940 Buth, D. G. BIOCHEMICAL SYSTEMATICS OF THE CYPRINID GENUS /NOTROPIS/--I. THE SUBGENUS /LUXILUS/. Biochem. Syst. Ecol. 7 (1): 69-79. 1979. SFA 24(3)
[Dep. Biol., Univ. Calif., Los Angeles 90024]

79-001941 Buth, D. G. DUPLICATE GENE EXPRESSION IN TETRAPLOID FISHES OF THE TRIBE MOXOSTOMATINI (/CYPRINIFORMES, CATOSTOMIDAE). Comp. Biochem. Physiol. B Comp. Physiol. 63 (1): 7-12. 1979. SFA 24(3)
[Dep. Biol., Univ. Calif., Los Angeles 90024]

79-001942 Chaudhuri, H. FERTILITY OF HYBRIDS OF INDIAN CARPS AND PRELIMINARY STUDIES ON THE F(2) GENERATION OF CARP HYBRIDS. J. Inland Fish. Soc. India 5: 195-200. Dec. 1973. SFA 24(3)

79-001943 Cross, T. F.; Ward, R. D.; Abreu-Grobois, A. DUPLICATE LOCI AND ALLELIC VARIATION FOR MITOCHONDRIAL MALIC ENZYME IN THE ATLANTIC SALMON, /SALMO SALAR/ L. Comp. Biochem. Physiol. B Comp. Biochem. 62 (4): 403-406. 1979. SFA 24(3)
[Dep. Zool., Univ. Park, Ireland]

79-001944 Dingman, J. D.; Clark, J. H. EVALUATION OF SYMPATRIC POPULATIONS OF WEST SLOPE CUTTHROAT AND YELLOWSTONE CUTTHROAT TROUT. J. Colo.-Wyo. Acad. Sci. 11 (1): 11. Apr. 1979. Abstract only. SFA 24(3)

[Univ. Denver, Denver, CO] Recently it has been demonstrated that races of a polytypic species, when in sympatry, can exhibit ecological segregation. In this study, two strains of cutthroat trout (/Salmo clarki/) were evaluated to determine if they would ecologically segregate when in sympatry. Westslope and Yellowstone cutthroat trout ecologically segregated with regard to distribution. Westslope cutthroat trout distributed in the littoral zone, whereas Yellowstone cutthroat trout distributed in the pelagic zone. Segregation by food habits was also evident. Westslope cutthroat trout appeared to be specialists, feeding predominantly on Chironomidae, as compared to Yellowstone cutthroat trout whose more generalized feeding habits included a large number of terrestrial insects. Yellowstone cutthroat trout exhibited a larger increment of growth than Westslope cutthroat trout, regardless of stocking size. However, Westslope cutthroat trout outsurvived Yellowstone cutthroat trout to age III. From this time period through age IV, Westslope cutthroat trout exhibited a higher mortality rate. This may be attributed to angling harvest since they were of catchable size and were located in the littoral zone. The use of both strains within a single lake would make more efficient utilization of the total environment, create increased angling diversity, and increase total trout production.

79-001945 Favro, L. D.; Kuo, P. K.; McDonald, J. F. POPULATION-GENETIC STUDY OF THE EFFECTS OF SELECTIVE FISHING ON THE GROWTH RATE OF TROUT. J. Fish. Res. Board Can. 36 (5): 552-561. May 1979. In English with French summ. SFA 24(3)

[Dep. Phys., Wayne State Univ., Detroit, MI 48202]

79-001946 Ferris, S. D.; Whitt, G. S. EVOLUTION OF THE DIFFERENTIAL REGULATION OF DUPLICATE GENES AFTER POLYPLOIDIZATION. J. Mol. Evol. 12: 267-317. 1979. SFA 24(3)

[G. S. Whitt: Dep. Genet. Dev., 515 Morrill Hall, Univ. Ill., Urbana 61801]

79-001947 Gold, J. R.; Karel, W. J.; Strand, M. R. CHROMOSOME FORMULAE OF NORTH AMERICAN FISHES. Tex. Agric. Exp. Stn. mp-1411: 24p. Feb. 1979. SFA 24(3)

[Dep. Plant Sci., Tex. A&M Univ., College Station] Chromosome formulae (diploid chromosome and chromosome arm number) are listed for 306 North American fish species, including representatives from 143 genera in 53 familes, which updates earlier lists by over 130 entries. In addition, the list displays the presence of microelements or sex chromosomes in the complements of several species. The source of taxa was the Third Edition (1970) of the list of common and scientific names of fishes prepared by the American Fisheries Society's Committee on Names of Fishes. This includes all known species from the freshwaters of the continental United States and Canada, and those marine species inhabiting contiguous shore waters on or above the continental shelf. Pelagic fishes that enter waters over the continental shelf are included; the Indo-Pacific fish fauna of Hawaii are not. The sequence of orders and families of fishes is essentially natural or phyletic, with the species of each family alphabetized by generic and specific names.

79-001948 Gorman, G. C.; Renzi, J., Jr. GENETIC DISTANCE AND HETEROZYGOSITY ESTIMATES IN ELECTROPHORETIC STUDIES: EFFECTS OF SAMPLE SIZE. Copiea 1979 (2): 242-249. 18 May 1979. SFA 24(3)
[Biol. Dep., UCLA, Los Angeles, CA 90024]

79-001949 Lanza, J. SELECTION PRESSURES AND EVOLUTION IN TWO ALL-FEMALE SPECIES OF FISH, /POECILIOPSIS MONACHA-LATIDENS/ AND /P. MONACHA-LUCIDA/. Ph.D. dissertation, Univ. Conn. 129p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5215. May 1979. SFA 24(3)

79-001950 Loudenslager, E. J. VARIATION IN THE GENETIC STRUCTURE OF POPULATIONS OF TWO POLYTYPIC VERTEBRATES, THE CUTTHROAT TROUT (/SALMO CLARKI/) AND THE DEER MOUSE (/PEROMYSCUS MANICULATUS/). Ph.D. dissertation, Univ. Wyo. 127p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1660. Oct. 1978. SFA 24(3)
Patterns of genetic differentiation among populations of cutthroat trout (/Salmo clarki/) in fluvial and lacustrine habitats as well as in an area where morphological types intergrade were studied in the Yellowstone and Snake River drainages. Genetic variability is very low for two parameters; the proportion of loci polymorphic per population averaged .05, and the proportion of loci heterozygous per individual averaged .01. These low values are attributed to population bottlenecks associated with a recent glaciation. The genetic identity of populations is within a narrow spectrum of 1.00 to .995. An estimation of time since divergence between the two morphological forms of cutthroat trout, based on the electrophoretic identity of proteins, is 20,000 years. These results support a hypothesis of a recent origin of the fine-spotted cutthroat trout within the Snake River drainage.--From abstr.

79-001951 Nayudu, P. L.; Hunter, C. R. CYTOLOGICAL ASPECTS AND DIFFERENTIAL RESPONSE TO MELATONIN OF MELANOPHORE BASED COLOR MUTANTS IN THE GUPPY, /POECILIA RETICULATA/. Copeia 1979 (2): 232-242. 18 May 1979. SFA 24(3)
[Dep. Obstet. Gynaecol., Monash Univ., Queen Victoria Med. Cent., Melborne, Victoria, 300 Australia]

79-001952 Nayudu, P. L. GENETIC STUDIES OF MELANIC COLOR PATTERNS AND ATYPICAL SEX DETERMINATION IN THE GUPPY, /POECILIA RETICULATA/. Copeia 1979 (2): 225-231. 18 May 1979. SFA 24(3)
[Dep. Obstet. Gynaecol., Monash Univ., Queen Victoria Med. Cent., Melborne, Victoria, 300 Australia]

79-001953 Park, E. H.; Park, S. D. A CULTURE TECHNIQUE USING MARINE FISH KIDNEY TO OBTAIN CHROMOSOMES. J. Fish. Res. Board Can. 36 (4): 458-461. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Biol., Han Yang Univ., Seoul 133, Korea]

79-001954 Place, A. R.; Powers, D. A. GENETIC VARIATION AND RELATIVE CATALYTIC EFFICIENCIES: LACTATE DEHYDROGENASE B ALLOZYMES OF /FUNDULUS HETEROCLITUS/. Proc. Natl. Acad. Sci. U.S.A. 76 (5): 2354-2358. May 1979. SFA 24(3)
[D. A. Powers: Dep. Biol., Johns Hopkins Univ., Baltimore, MD 21218]

79-001955 Taniguchi, N.; Morita, T. [IDENTIFICATION OF EUROPEAN, AMERICAN, AND JAPANESE EELS BY LACTATE DEHYDROGENASE AND MALATE DEHYDROGENASE ISOZYME PATTERNS.] Bull. Jpn. Soc. Sci. Fish. 45 (1): 37-41. Jan. 1979. SFA 24(3)
[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nankoku, Kochi Pref., 783, Japan]

79-001956 Verigin, B. V.; Makeeva, A. P.; Shubnikova, N. G. [A CASE OF NATURAL HYBRIDIZATION BETWEEN /HYPOPHTHALMICHTHYS MOLITRIX/ AND /ARISTICHTHYS NOBILIS/ (PISCES, CYPRINIDAE).] Zool. Zh. 58 (2): 190-196. Feb. 1979. In Russian with English summ. SFA 24(3)
[Biol. Fac., State Univ. Moscow, Moscow, USSR] The mass hybridization between the silver carp and the bighead was registered in 1977 in the Syrdarja River. The parental species differ from each other reliably by 11 out of 21 characters under study. The hybrids occupy an intermediate position between the parents by many characters but tend to the bighead. A suggestion is put forward to the effect that an intensive hybrid introgression will take place in the Syrdarja River basin.

79-001957 Wolfe, G. W.; Branson, B. A.; Jones, S. I. AN ELECTROPHORETIC INVESTIGATION OF SIX SPECIES OF DARTERS IN THE SUBGENUS /CATONOTUS/. Biochem. Syst. Ecol. 7 (1): 81-85. 1979. SFA 24(3)
[Dep. Zool., Univ. Tenn., Knoxville 37916]

BEHAVIOR

79-001958 Albrecht, H. EINIGE BEOBACHTUNGEN AN ANEMONENFISCHEN IN DER KARIBISCHEN SEE. [SOME OBSERVATIONS ON ANEMONE FISHES IN THE CARIBBEAN.] Bijd. Dierkd. 47 (1): 109-119. 1977. In German with English summ. SFA 24(3)
[Abteilung tierverhalten, Univ. Amsterdam, Netherlands] Anemone fishes shelter in sea anemones. Well known is the symbiosis of the idopacific genus /Amphiprion/ (Pomacentridae) with /Stoichactis gigantea/ and some other anemones. The present paper records some 30 fishes, members of 12 different families, associated with /Condylactis gigantea/ in Curacao, Caribbean Sea. It concerns mostly juveniles of small, inconspicuous fish species.

79-001959 Bassler, G.; Hiltig, F.; Rahmann, H. UNTERSUCHUNGEN ZUR CIRCADIANEN RHYTHMIK DER ELEKTRISCHEN UND MOTORISCHEN AKTIVITAET VON /GNATHONEMUS PETERSII/ (MORMYRIDAE, PISCES). [DIURNAL RHYTHM OF THE ELECTRIC AND MOTORIC ACTIVITY OF /GNATHONEMUS PETERSII/ (MORMYRIDAE, PISCES).] J. Comp. Ethol. 49 (2): 156-163. Feb. 1979. In German with English summ. SFA 24(3)
[Zool. Inst., Univ. Stuttgart/Hohenheim, West Germany]

79-001960 Bauer, R. ELECTRIC ORGAN DISCHARGE (EOD) AND PREY CAPTURE BEHAVIOUR IN THE ELECTRIC EEL, /ELECTROPHORUS ELECTRICUS/. Behav. Ecol. Sociobiol. 4 (4): 311-319. 1979. SFA 24(3)
[T. Szabo: C.N.R.S. IEN 3, F-91190 Gif-sur-Yvette, France]

79-001961 Beitinger, T. L.; Fitzpatrick, L. C. PHYSICIOGICAL AND ECOLOGICAL CORRELATES OF PREFERRED TEMPERATURE IN FISH. Am. Zool. 19 (1): 319-329. 1979. SFA 24(3)
[Dep. Biol. Sci., North Tex. State Univ., Denton 76203]

79-001962 Belbenoit, P.; Moller, P.; Serrier, J.; Bush, S. ETHOLOGICAL OBSERVATIONS ON THE ELECTRIC ORGAN DISCHARGE BEHAVIOUR OF THE ELECTRIC CATFISH, /MALAPTERURUS ELECTRICUS/ (PISCES). Behav. Ecol. Sociobiol. 4 (4): 321-330. 1979. SFA 24(3)
[Lab. Physiol. Nerv., Dep. Neurophysiol. Sens. C.N.R.S., F-91190 Gif-sur-Yvette, France]

79-001963 Bodznick, D. A. THE PHYSIOLOGY OF OLFACTION IN SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) AND ITS RELATIONSHIP TO MIGRATORY BEHAVIOR. Ph.D. dissertation, Univ. Wash. 153p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):591. Aug. 1978. SFA 24(3)

79-001964 Bullock, T. H.; Corwin, J. T. ACOUSTIC EVOKED ACTIVITY IN THE BRAIN IN SHARKS. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 129 (3): 223-234. 1979. SFA 24(3)
[Scripps Inst. Oceanogr., La Jolla, CA 92093]

79-001965 Craik, G. J. S. A FURTHER INVESTIGATION OF THE HOMING BEHAVIOUR OF THE INTERTIDAL COTTID, /CLIDOCOTTUS MACULOSUS/ GIRARD. Ph.D. dissertation, Univ. British Columbia 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5272. May 1979. SFA 24(3)

79-001966 Cross, J. N. CONTRIBUTIONS TO THE BIOLOGY OF THE WOUNDFIN, /PLAGOPTERUS ARGENTISSIMUS/ (PISCES: CYPRINIDAE), AN ENDANGERED SPECIES. Great Basin Nat. 38 (4): 463-468. 31 Dec. 1978. SFA 24(3)
[Fish. Res. Inst., Coll. Fish., Univ. Wash., Seattle 98105] The woundfin is a small, streamlined, omnivorous cyprinid that is now limited to the Virgin River basin where it was collected in the mainstream and one tributary during the present study. The woundfin occurred most frequently in runs and over sand substrates and less frequently in riffles and over rock substrates. It was common over at least half of its original range within the Virgin River. It was uncommon in the lower mainstream due to habitat alterations and, presumably, predation by and competition with exotic species.

79-001967 Devitsina, G. V.; Belousova, T. A. ON THE PARTICIPATION OF THE TRIGEMINAL SYSTEM IN ODOR RECEPTION IN FISH. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 114-120. 1978. SFA 24(3)
[Moscow Univ., USSR] The trigeminal system of the pike, /Esox lucius/, and the tench, /Tinca tinca/, reacts to stimulation of the olfactory lining by solutions of different chemical substances. Responses recorded in the maxillary branch of the trigeminal nerve demonstrate a clear correlation with similar responses in the olfactory tract. In the process of odor reception in fish the trigeminal and olfactory systems have close functional interaction,

79-001967 CONTINUED
occurring in the higher portions of the central nervous system.

79-001968 Gottschalk, B.; Scheich, H. PHASE SENSITIVITY AND PHASE COUPLING: COMMON MECHANISMS FOR COMMUNICATION BEHAVIORS IN GYMNOTID WAVE AND PULSE SPECIES. Behav. Ecol. Sociobiol. 4 (4): 395-408. 1979. SFA 24(3)
[H. Scheich: Inst. tech. Hochsch. Darmstadt, Schnittspahnstr. 3, D-6100 Darmstadt, West Germany]

79-001969 Greenblatt, P. R. ASSOCIATIONS OF TUNA WITH FLOTSAM IN THE EASTERN TROPICAL PACIFIC. NOAA Fish. Bull. 77 (1): 147-155. Jan. 1979. SFA 24(3)
[Code A-008, Scripps Inst. Oceanogr., Univ. Calif., La Jolla 92093]
The fishing record for flotsam-associated tuna in the eastern tropical Pacific was examined. The rivers of Central America are probably the major source of flotsam. Correlation analysis of the number of sets occurring in an area indicates that unassociated tuna and flotsam-associated tuna are related. The number of sets made on floating objects has increased dramatically since 1971. The percentage of flotsam-associated sets has increased, indicating that flotsam-associated sets are more important to the tuna fishery than in 1963. The catch per set of tuna associated with a flotsam has also increased markedly since 1967. Analysis of length-frequency data indicate that, on a single set basis, tuna fork length is more variable in sets associated with flotsam than with unassociated schoolfish sets. Results of the length-frequency analysis support the idea that flotsam aggregates tuna.

79-001970 Grimshaw, H. J. SPECIES AND MATE DISCRIMINATION IN THE BLUEGILL SUNFISH, /LEPOMIS MACROCHIRUS/ (PISCES: CENTRARCHIDAE). Ph.D. dissertation, Univ. Okla. 36p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(10):4768. Apr. 1979. SFA 24(3)
Sexually mature male bluegills maintained on a 16L:8D h photoperiod were able to discriminate between bluegill and longear sunfishes, when size, sex and individual variation were eliminated as possible cues. The discrimination was based on species differences, appeared to be exclusively transduced via the visual system, and did not occur prior to training. The type of locomotion, orientation to the stimulus fishes, and some behaviors associated with locomotion changed during the training process and exhibited individual variation. The behavior maintained at levels significantly above chance for sustained periods of time, in the absence of negative reinforcement, exhibited extinction, and appeared to extinguish at a more rapid rate when a biologically significant stimulus component was experimentally manipulated. Visual stimuli resulting from the movement of the stimulus fishes proved to be essential for the development and maintenance of the discrimination. To my knowledge, this is the first time species discrimination has been demonstrated in the laboratory on vertebrates using conditioning techniques. The technique promises to have wide applicability in studies of animal communication.

79-001971 Grossman, G. D. SYMBIOTIC BURROW-OCCUPYING BEHAVIOR IN THE BAY GOBY, /LEPIDOGOBIUS LEPIDUS/. Calif. Fish Game 65 (2): 122-124. Apr. 1979. SFA 24(3)
[Dep. Wildl. Fish. Biol., Univ. Calif., Davis 95616]

79-001972 Guillory, V. SPECIES ASSEMBLAGES OF FISH IN LAKE CONWAY. Fla. Sci. 42 (3): 158-162. 1979. SFA 24(3)
[Fla. Game Fresh Water Fish Comm., P.O. Box 1903, Eustis 32726]

79-001973 Hall, L. W., Jr.; Hocutt, C. H.; Stauffer, J. R., Jr. TEMPERATURE PREFERENCE OF THE WHITE PERCH, /MORONE AMERICANA/, COLLECTED IN THE WICOMICO RIVER, MARYLAND. Estuaries 2 (2): 129-132. June 1979. SFA 24(3)
[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 21532] Temperature preference tests were conducted on fresh water white perch (/Morone americana/), collected from the Wicomico River, Maryland. Collection temperature was 27 C and acclimation temperatures used in temperature preference tests were 6, 12, 18, 24, 30, and 33 C. The following methods were used to determine the final temperature preference: linear regression, quadratic equation, and "eyeball" plots. Recorded final temperature preference values were 28.9, 29.3 and 30.6 C using each method respectively.

79-001974 Helfman, G. S. TWILIGHT ACTIVITIES OF YELLOW PERCH, /PERCA FLAVESCENS/. J. Fish. Res. Board Can. 36 (2): 173-179. Feb. 1979. In English with French summ. SFA 24(3)
[Dep. Zool., Univ. Ga., Athens 30602]

79-001975 Hixon, M. A. THE HALFMOON, /MEDIALUNA CALIFORNIENSIS/, AS A CLEANER FISH. Calif. Fish Game 65 (2): 117-118. Apr. 1979. SFA 24(3)
[Dep. Biol. Sci., Univ. Calif., Santa Barbara 93106]

79-001976 Ina, K.; Ryohgi, Y.; Higashi, K. [COLOR SENSITIVITY OF SEA BREAM (/CHRYSOPHRYS MAJOR/).] Bull. Jpn. Soc. Sci. Fish. 45 (1): 1-5. Jan. 1979. In Japanese with English summ. SFA 24(3)
[Dep. Agric. Chem., Fac. Agric., Shizuoka Univ., 836 Oya Shizuoka 420, Japan]

79-001977 Itzkowitz, M. THE FEEDING STRATEGIES OF A FACULTATIVE CLEANERFISH, /THALASSOMA BIFASCIATUM/ (PISCES: LABRIDAE). J. Zool. (Lond.) 187 (3): 403-413. Mar. 1979. SFA 24(3)
[Dep. Zool., Univ. West Indies, Kingston 7, Jamaica] The adult Bluehead wrasse (/Thalassoma bifasciatum/) is a facultative cleanerfish that can change its colouration into any one of three patterns. These patterns correspond to several modes of feeding behaviour which, in turn, can be correlated with the movements of host fishes. The barred pattern occurred on individuals that are far ranging and also on those that formed unstable cleaning groups. These groups tended to form at locations having sharp drops in depth of several metres. Here these groups service large groups of host fishes. The striped pattern occurred on solitary individuals with a limited home range. They occurred in very shallow areas and serviced small groups of host fishes. The bright yellow pattern developed when a large food source was discovered and may be related to the attraction of conspecifics.

79-001978 Jakobsson, S.; Radesater, T.; Jarvi, T. ON THE FIGHTING BEHAVIOUR OF /NANNACARA ANOMALA/ (PISCES, CICHLIDAE) MALES. J. Comp. Ethol. 49 (2): 210-220. Feb. 1979. SFA 24(3)
[Div. Ethol., Dep. Zool., Univ. Stockholm, Sweden]

79-001979 Johnsen, P. B. CONTRIBUTIONS ON THE MOVEMENTS OF FISH: I. BEHAVIORAL MECHANISMS OF UPSTREAM MIGRATION AND HOMESTREAM SELECTION IN COHO SALMON (/ONCORHYNCHUS KISUTCH/). II. WINTER AGGREGATIONS OF CARP (/CYPRINUS CARPIO/) AS REVEALED BY ULTRASONIC TRACKING. Ph.D. dissertation, Univ. Wis. 134p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(10):4769. Apr. 1979. SFA 24(3)

79-001980 Kashin, S. M.; Feldman, A. G.; Orlovsky, G. N. DIFFERENT MODES OF SWIMMING OF THE CARP, /CYPRINUS CARPIO/ L. J. Fish Biol. 14 (4): 403-405. Apr. 1979. SFA 24(3)
[Inst. Oceanol., Acad. Sci., Moscow, USSR] An electromyographical study has been made of carp swimming muscles at various points along the body length during sustained and burst locomotion. During sustained swimming, red muscles show a constant time lag between activation of anterior and posterior segments which is practically independent of the speed of locomotion. In contrast, anterior and posterior homolateral segments are activated simultaneously during bursts of rapid movement. This pattern of co-ordination between body segments differs from that reported for other species.

79-001981 McCauley, R. W.; Huggins, N. W. ONTOGENETIC AND NON-THERMAL SEASONAL EFFECTS ON THERMAL PREFERENDA OF FISH. Am. Zool. 19 (1): 267-271. 1979. SFA 24(3)
[Dep. Biol., Wilfrid Laurier Univ., Waterloo, ON N2L 3C5, Canada]

79-001982 McMahon, T. E.; Tash, J. C. THE USE OF CHEMOSENSES BY THREADFIN SHAD, /DOROSOMA PETENENSE/ TO DETECT CONSPECIFICS, PREDATORS AND FOOD. J. Fish Biol. 14 (3): 289-296. Mar. 1979. SFA 24(3)
[Ariz. Coop. Fish. Res. Unit, Univ. Ariz., Tucson 85721] The abilities of threadfin shad (/Dorosoma petenense/) in using chemosenses to detect the scents of conspecifics, a predator and food were tested in the laboratory. Shad did not respond to the scents of conspecifics or a predator; possibly because both shad and their predators outswim such cues as chemical scents that are transmitted slowly through the water. Shad showed a strong attraction to the scents of food. In feeding, chemosenses may be used for filter feeding on microscopic food and for locating food beyond the range of vision.

79-001983 Mishrigi, S. Y.; Kubo, T. EFFECTS OF TERRITORIALITY ON OXYGEN CONSUMPTION IN /TILAPIA NILOTICA/. Bull. Fac. Fish. Hokkaido Univ. 29 (4): 308-312. Nov. 1978. SFA 24(3)
[Nanae Fish Cult. Exp. Stn., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan] The aggressive behaviour associated with territoriality in case of /Tilapia nilotica/ was found to elevate the oxygen consumed to meet standard and routine metabolism energy requirements at 26°C. This was traced for both small immature and big matured fish. On the other hand matured fish showed a decrease of about 50 percent in the oxygen consumed for specific dynamic action. This suggests an increase in the weight exponent and a decrease on the level of metabolism of the T-line equation. Also, there is a correlation between the available space to meet the territory requirements and hence the magnitude of the aggressive behaviour, and runting of tilapia under

79-001983 CONTINUED
culture condition.

79-001984 Niwa, H. S-POTENTIAL-SPECTRAL SENSITIVITY IN TWO GOBIES, /ACANTHOGOBIUS FLAVIMANUS/ AND /GLOSSOGOBIUS OLIVACEUS/ (GOBIIDAE). Comp. Biochem. Physiol. A Comp. Physiol. 62 (4): 1031-1033. 1979. SFA 24(3)
[Fish Lab., Fac. Agric., Nagoya Univ., Nagoya, Japan]

79-001985 Olla, B. L.; Bejda, A. J.; Martin, A. D. SEASONAL DISPERSAL AND HABITAT SELECTION OF CUNNER, /TAUTOGOLABRUS ADSPERSUS/, AND YOUNG TAUTOG, /TAUTOGA ONITIS/, IN FIRE ISLAND INLET, LONG ISLAND, NEW YORK. NOAA Fish. Bull. 77 (1): 255-261. Jan. 1979. SFA 24(3)
[NMFS, Sandy Hook Lab., Highlands, NJ 07732] Results of field observations examining seasonal movements in the cunner, /Tautogolabrus adspersus/, and young tautog, /Tautoga onitis/, showed a small portion of a resident population located off Fire Island, N.Y., to disperse seasonally. Dispersal was from habitats which provide cover for both species throughout the year to seasonal habitats occupied primarily during summer. While both species exhibit a high degree of association with cover, results of experimental transfers of young tautog, monitored either ultrasonically or directly by divers with self contained underwater breathing apparatus, showed that fish will leave a suboptimal habitat ever though cover is present. Dispersal and habitat selection are discussed in relation to seasonal changes in the environment and ecological requirements of the fish.

79-001986 Ovcharov, O. P. SOME HYDRODYNAMIC FEATURES OF THE BLACK SEA SCORPIONFISH, /SCORPAENA PORCUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 153-156. 1978. SFA 24(3)
[Inst. Biol. South. Seas, UkrSSR Acad. Sci., Sevastopol, USSR]

79-001987 Pitcher, T. SENSORY INFORMATION AND THE ORGANIZATION OF BEHAVIOUR IN A SHOALING CYPRINID FISH. Anim. Behav. 27 (1): 126-149. Feb. 1979. SFA 24(3)
[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd, Wales] Quantitative comparison of the behaviour of bream, /Abramis brama/ (L.), under 4 controlled conditions indicates that the organization and spectrum of behaviours of this shoaling teleost fish differ according to the sensory information it receives from a conspecific. Bream are true social animals, behaving normally only when in full sensory contact, in contrast to earlier suggestions that vision alone could mediate fish social behaviour. Both lateral line and vision are employed simultaneously to maintain individual distance. Mirror images, fish images and real fish are distinguished at different distances, but only the abnormal feedback from an approachable mirror is eventually compensated for, indicating considerable central porcessing. Lack of lateral line input causes a greater synchrony with the image of a neighbour, reinforcing a similar recent finding in schooling saithe. Bream in full sensory contact are more likely to make forays away from each other. In this paper I recommend the use of 'shoal' as a more helpful general term for a social group of fish (equivalent to 'flock' in birds), the term 'school' being restricted to polarized synchronized groups. Lateral line, vision and olfaction are used in shoals, but probably only lateral line and vision in the maintenance of schooling.

79-001988 Quertermus, C.; Mitchell, G. C. HABITAT SELECTION OF TELEMETERED LARGEMOUTH BASS IN LAKE CARROLL, CARROLL COUNTY, GEORGIA. Ga. J. Sci. 37 (2): 72. Apr. 1979. Abstract only. SFA 24(3)
[West Ga. Coll., Carrolton] Fifteen largemouth bass, /Micropterus salmoides/, were tracked in Lake Carroll using ultrasonic telemetry techniques. Three aspects of fish habitat selection (distance from shore, water depth and dock utilization) were analyzed in relation to selected variables. The depth of water selected was significantly related to water temperature and water clarity (light penetration). Fish were found in shallower water at lower water temperatures and reduced water clarity. The only variable significantly related to dock utilization was barometric pressure. When fish were in water less than 1.5 meters they utilized docks more often at higher barometric pressures. No significant relationships between fish distance from shore and the independent variables were found. Analysis of habitat utilization by season (spring, summer, fall) showed fish (1) were closer to the bank in spring than either summer or fall, (2) stayed in shallower water in spring and fall, and (3) utilized docks more in fall than either spring or summer.

79-001989 Rahmann, H.; Jeserich, G.; Zeutzius, I. ONTOGENY OF VISUAL ACUITY OF RAINBOW TROUT UNDER NORMAL CONDITIONS AND LIGHT DEPRIVATION. Behaviour 68 (3,4): 315-322. 1979. In English with German summ. SFA 24(3)
[Inst. Zool., Univ. Stuttgart-Hohenheim, West Germany]

79-001990 Reynolds, W. W.; Casterlin, M. E. PHOTOKINETIC RESPONSES AND DIEL ACTIVITY OF SEA LAMPREY /PETROMYZON MARINUS/ AMMOCOETE LARVAE. J. Fish Biol. 14 (4): 425-428. Apr. 1979. SFA 24(3)
[Dep. Biol., Pa. State Univ., P.O. Box 1830, Wilkes-Barre 18708] Twenty-four ammocoete larvae of the sea lamprey /Petromyzon marinus/ were tested individually for 3-day periods in electronic shuttleboxes (Ichthyotrons) with natural lighting through windows, to determine their diel activity pattern in terms of hourly percentages of the 24-h total. Mean hourly activity was slightly greater during the day (4.7 percent h^{-1}) than at night (3.7 percent h^{-1}). Peak hourly activity (7.2 percent h^{-1}) occurred during the dawn crepuscular period as light levels were increasing, while the minimum hourly activity (1.6 percent h^{-1}) occurred during the dusk crepuscular period while light levels were decreasing. The observed activity pattern is atypical of other aquatic animals similarly tested, and might be explained as an extraoptically mediated photokinetic response.

79-001991 Reynolds, W. W.; Casterlin, M. E. THERMOREGULATORY BEHAVIOR OF BROWN TROUT, /SALMO TRUTTA/. Hydrobiologia 62 (1): 79-80. 8 Jan. 1979. SFA 24(3)
[Dep. Biol., Pa. State Univ., Wilkes-Barre 18708] Brown trout, /Salmo trutta/, were allowed to thermoregulate individually in an electronic shuttlebox. Pooled data for 6 fish showed a diel pattern of preferred temperature, with a diurnal minimum of 10.3°C, an early nocturnal maximum of 13.7°C, a less pronounced mid-scotophase minimum of 11.7°C, and a secondary dawn maximum of 12.8°C, in a somewhat crepuscular pattern. The 24-hour mean preferendum was 12.2°C.

79-001992 Schmulbach, J. C.; Tunink, D. H.; Zittel, A. E. SWIMMING PERFORMANCE OF MISSOURI RIVER FISHES. Proc. N.D. Acad. Sci. 33: 55. Apr. 1979. Abstract only. SFA 24(3)
[Dep. Biol., Univ. S. Dak., Vermillion 57069]

79-001993 Spigarelli, S. A.; Thommes, M. M. TEMPERATURE SELECTION AND ESTIMATED THERMAL ACCLIMATION BY RAINBOW TROUT (/SALMO GAIRDNERI/) IN A THERMAL PLUME. J. Fish. Res. Board Can. 36 (4): 366-376. Apr. 1979. In English with French summ. SFA 24(3)
[Ecol. Sci. Sect., Argonne Natl. Lab., Argonne, IL 60439]

79-001994 Stott, B.; Buckley, B. R. AVOIDANCE EXPERIMENTS WITH HOMING SHOALS OF MINNOWS, /PHOXINUS PHOXINUS/ IN A LABORATORY STREAM CHANNEL. J. Fish Biol. 14 (2): 135-146. Feb. 1979. SFA 24(3)
[Salmon Freshwater Fish. Lab., Minist. Agric. Fish. Food, Whitehall Place, London SW1A 2HH, England] In a laboratory stream channel consisting of two tributaries joining to form a 'river' it proved possible to establish three populations of minnows in separate home ranges. Minnows in the apparatus avoided water with low concentrations of dissolved oxygen but returned to the home range when aerated water was re-established. Concentrations of 4,8 and 10 mg l^{-1} of phenol did not cause avoidance behaviour, in fact the highest concentration killed some fish, but activity levels were severely depressed and shoaling behaviour was also affected.

79-001995 Waddle, H. R.; Wilson, J. L.; Coutant, C. C. SUMMER HABITAT SELECTION OF STRIPED BASS, /MORONE SAXATILIS/ IN CHEROKEE RESERVOIR, TENNESSEE. J. Tenn. Acad. Sci. 54 (2): 74. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Tenn., Knoxville] Summer habitat selection patterns of 18 adult striped bass (/Morone saxatilis/) in Cherokee Reservoir were monitored with externally attached temperature-sensing accustic or radio transmitters from June through September, 1977. Summer home ranges of most fish correspond to cool, oxygenated spring or tributary effluents feeding shallow, submerged channels (less than 10 m deep) located in the lower reservoir. The inhabited areas or refuges differed from non-inhabited areas by maintaining temperatures less than or equal to 22 C and dissolved oxygen (d.o.) concentrations greater than 5 mg/l. Total water hardness, pH, and water transparency were not significantly different among refuges and non-inhabited areas. Movement of fish outside refuges occurred more frequently and for longer periods during June when the temperature-d.o. regime was less severe. Fish experienced temperatures between 15 and 27 C with mean temperatures of individuals ranging from 18.5 to 22.0 C. Several tagged fish migrated outside the refuges and selected the lowest available temperature, generally near 21 C, even though d.o. concentrations at these temperatures were 3 mg/l or less. Longterm survival of tagged and non-tagged fish outside refuges was undetermined because no fish were tracked outside a refuge for more than 12 days without being lost. This study indicates that temperature strongly influences the behavior of striped bass and that this species' thermal preferendum is approximately 21 C.

79-001996 Welch, H. E. SWIMMING PERFORMANCE OF ARCTIC CHAR FROM THE SAQVAQJUAC RIVER, NORTHWEST TERRITORIES. Fish. Envircn. Can. Fish. Mar. Serv. Tech. Rep. No. 854. iv + 7p. May 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Winnipeg, MB R3T 2N6, Canada] Swimming performance tests were made cn Arctic char (/Salvelinus alpinus/) on location at the Saqvaqjuac River 50 km north of Chesterfield Inlet, NWT. Critical velocity (maximum swimming speed, cm s^{-1}, which cculd be maintained for 10 min) was equal to (10.19) (fork length $^{0.606}$). The data are compared with previcus results for several species from the Mackenzie River, relative tc a fish's ability tc pass through highway culverts of certain lengths and water velocities.

79-001997 Westby, G. W. M. EIECTRICAL CCMMUNICATION AND JAMMING AVOIDANCE BETWEEN RESTING /GYMNOTUS CARAPO/. Behav. Ecol. Sociobiol. 4 (2): 381-393. 1979. SFA 24(3)
[Dep. Psychol., Univ. Sheffield, Sheffield S10 2TN, England]

79-001998 Williams, A. H. INTERFERENCE BEHAVICR AND ECOICGY OF THREESPOT DAMSELFISH (/EUPCMACENTRUS PLANIFRONS/). Cecolcgia (Berl.) 38 (2): 223-230. 1979. SFA 24(3)
[Duke Univ. Mar. Iab., Beaufort, NC 28516]

LIFE HISTORIES-GENERAL WCRKS

79-001999 Barnabe, G. ETUDE DANS LE MILIEU NATUREI ET EN CAPTIVITE DE L'ECO-ETHOLCGIE DU LOUP /DICENTRARCHUS IABRAX/ (I.) (PCISSON SERRANIDAE) A L'AIDE DE NOUVELLES TECHNIQUES. [AN ECO-ETHOICGICAL STUDY OF THE SEA BASS /DICENTRARCHUS LABRAX/ (I.) (GROUP SERRANIDAE) IN ITS NATURAL ENVIRONMENT AND CAPTIVITY USING NEW TECHNIQUES.] Ann. Sci. Nat. Zool. Biol. Anim. 20 (4): 423-5C2. Oct.-Dec. 1978. In French with English summ. SFA 24(3)
[Univ. Sci. Tech. Languedoc, Stn. Biol. Mar. Lagunaire, quai de Bosc prolonge, 34200 Sete, France]

79-002000 Bhatnagar, G. K. CN SCME ASPECTS OF THE BIOICGY CF /PUNTIUS KOLUS/ (SYKES) CF THE TUNGABHADRA RESERVOIR. Indian J. Fish. 10 (2a): 500-520. 1963. SFA 24(3)

79-002001 Bishop, K. A.; Bell, J. D. ASPECTS OF THE BIOLOGY OF THE AUSTRALIAN GRAYLING /PRCTOTRCCTES MARAENA/ GUNTHER (PISCES: PRCTCTRCCTIDAE). Aust. J. Mar. Freshwater Res. 29 (6): 743-761. Dec. 1978. SFA 24(3)
[New South Wales State Fish., P.O. Box N211, Grosvenor St., Sydney, N.S.W. 2000, Australia] The Australian grayling, /P. maraena/, is generally regarded as Australia's most endangered freshwater fish species. A sample of 312 specimens from the Shoalhaven River, N.S.W., provided data cn various aspects of its biology. The sample showed a bimodal length frequency distributicn of 1+ and 2+ fish aged by otoliths. Grayling appear to suffer severe mortality, possibly as a result of spawning at age 2. The spawning season in the Shcalhaven River was from early Febrary tc early March and available data suggest that grayling are anadromous. /P. maraena/ is a micrcphagic omnivore, and stomachs sampled contained principally cladocerans, algae and small insects. The need for further research tc elucidate the grayling's habitat requirements and to determine effective

79-002001 CONTINUED
conservation measures is stressed.

79-002002 Chakrabarty, R. D.; Singh, S. B. OBSERVATIONS ON SOME ASPECTS OF THE FISHERY AND BIOLOGY OF THE MRIGAL, /CIRRHINA MRIGALA/ (HAMILTON) FROM ALLAHABAD. Indian J. Fish. 10 (1a): 209-232. 1963. SFA 24(3)

79-002003 David, A. FISHERY BIOLOGY OF THE SCHILBEID CAT-FISH, /PANGASIUS PANGASIUS/ (HAMILTON) AND ITS UTILITY AND PROPAGATION IN CULTURE PONDS. Indian J. Fish. 10 (2a): 521-600. 1963. SFA 24(3)

79-002004 David, A.; Rahman, M. F. STUDIES ON SOME ASPECTS OF FEEDING AND BREEDING OF /PUNTIUS PULCHELLUS/ (DAY) AND ITS UTILITY IN CULTURABLE WATERS. J. Inland Fish. Soc. India 7: 225-238. Dec. 1975. SFA 24(3)

79-002005 Desai, V. R. STUDIES ON FISHERY AND BIOLOGY OF /TOR TOR/ (HAMILTON) FROM RIVER NARMADA. II. MATURITY, FECUNDITY AND LARVAL DEVELOPMENT. Proc. Indian Natl. Sci. Acad. B 39 (2): 228-248. Apr. 1973. SFA 24(3)
The breeding habits of /Tor tor/ from the river Narmada were studied for a period of three years on the basis of gross examination of gonads, gonadosomatic index and ova diameter. The breeding commences in July and continues intermittently till February-March. The fish breed in succession at different times exhibiting prolonged breeding. The peak breeding was observed from July to September. The individual fish was found to breed in four acts extending over a period of 2-3 months. The length frequency study of fry also indicated that the breeding period extends from July to March. The condition of fish (K) was low during peak breeding period and the spawning strain was comparatively more in males. The fish attained first maturity over 360 mm in total length. The fecundity of mature fish varied from 9,330 to 135,470 in the size range of 283-750 mm. The larval development of /Tor tor/ based on the connected series of five stages has been described.

79-002006 Folz, D. LIVING FOSSIL. Wis. Nat. Resour. 3 (2): 4-7. Mar.-Apr. 1979. SFA 24(3)
[Wis. Dep. Nat. Resour., Oshkosh]

79-002007 Hoff, J. G. ANNOTATED BIBLIOGRAPHY AND SUBJECT INDEX ON THE SHORTNOSE STURGEON, /ACIPENSER BREVIROSTRUM/. NOAA Tech. Rep. NMFS SSRF- 731. 16p. Apr. 1979. SFA 24(3)
[Southeast. Mass. Univ., North Dartmouth 02747] A bibliography that consists of 165 references on the classification, distribution, abundance, life history, and ecology of the shortnose sturgeon, /Acipenser brevirostrum/. Brief annotations and a subject index are included for this rare and endangered species.

79-002008 Hoyt, R. D.; Overmann, G. J.; Kindschi, G. A. OBSERVATIONS ON THE LARVAL ECOLOGY OF THE SMALLMOUTH BUFFALO. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 1-16. 1979. SFA 24(3)
[Dep. Biol., West. Ky. Univ., Bowling Green 42101] Buffalo were first observed spawning in Rough River Lake on April 30, 1978, at 17.5 C. Larvae were first collected from the lake on May 6. A total of 52 larvae was collected from the lake from May 6-May 30. Eggs from a second spawn were observed on May 19, but no larvae were collected from that spawn. Larvae were taken in all the upper reaches of the lake sampled. Larvae occurred chiefly on the surface at night. Growth averaged 1.6 mm per week with larvae being 5.1 to 9.1 mm total length. Buffalo larvae disappeared first from shallow water areas. Larval densities were highest at the start of the spawn and decreased thereafter. Densities averaged 0.257 fish/100 m^3. Based on densities observed in the study, larval recruitment at 10 mm length totaled approximately 320,000 fish for the entire lake. Forty-five of the larvae taken were pre-larvae while 7 were early postlarvae. Developmental patterns were similar to that reported in the literature. Food items, including rotifers and copepod nauplii, were observed in the stomachs of two postlarvae.

79-002009 Hughes, S. E.; Hirschhorn, G. BIOLOGY OF WALLEYE POLLOCK, /THERAGRA CHALCOGRAMMA/, IN THE WESTERN GULF OF ALASKA, 1973-75. NOAA Fish. Bull. 77 (1): 263-274. Jan. 1979. SFA 24(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] Data on the stock composition, growth, mortality, and abundance of walleye or Alaska pollock, /Theragra chalcogramma/, in the western Gulf of Alaska were collected during six demersal trawl surveys in 1973-75. Over 102,000 km^2 of continental shelf and slope were surveyed; most of this area was covered during spring and summer. Using the area-swept technique and catchability coefficients of 1.0 and 0.5, the exploitable pollock biomass in the survey region was between 610,000 and 1,220,000 metric tons. The percentage of larger and older fish increased to the west. Sexual maturity was reached at age 3. Growth completion rates ranged from 0.2 to 0.4. Natural mortality was estimated (assuming natural mortality equals growth completion rate) at 0.33 for males and 0.30 for females. Variations in growth completion rates within year class and variable recruitment strength indicated a probably east-west separation of pollock spawning populations near Kodiak.

79-002010 Jinadasa, J. BIOLOGY OF THE SCIAENID GENERA /PARALONCHURUS/ AND /LONCHURUS/ (PISCES, SCIAENIDAE). Ph.D. dissertation, Univ. Mass. 279p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(8):3614. Feb. 1979. SFA 24(3)

79-002011 Kindschi, G. A.; Hoyt, R. D.; Overmann, G. J. SOME ASPECTS OF THE ECOLOGY OF LARVAL FISHES IN ROUGH RIVER LAKE, KENTUCKY. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 139-166. 1979. SFA 24(3)
[Dep. Biol., West. Ky. Univ., Bowling Green 42101] Some aspects of the ecology of larval and juvenile fishes were investigated in Rough River Lake, Kentucky, from April through August, 1978. Larval fish were collected weekly from the upper reaches of the lake from the surface and bottom, during daylight and dark periods. Twenty-three species and 3 categories of unknown larval and juvenile fishes represented by 177,119 individuals were collected. White bass and logperch were the first to appear on April 15 with surface water

79-002011 CONTINUED
temperatures of 18.5 C. Gizzard shad larvae dominated net collections while /Lepomis/ spp. were the second most abundant. Larvae were primarily concentrated near the surface and taken mostly at night. Larval concentrations were greatest on May 30. Throughout the study, specimens were collected mainly along the shorelines. Growth rates of most taxa generally lagged early in life increasing greatly after the first 6-8 weeks. Light traps supported the surface-night distribution pattern for several species. Piscivory was observed in white bass 10.5-25 mm total length on gizzard shad, and logperch 16.5-17 mm total length on unknown larvae and suckers.

79-002012 Krause, R. A.; Van Den Avyle, M. J. TEMPORAL AND SPATIAL VARIATIONS IN ABUNDANCE AND SPECIES COMPOSITION OF LARVAL FISHES IN CENTER HILL RESERVOIR, TENNESSEE. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 167-184. 1979. SFA 24(3)
[Tenn. Coop. Fish. Res. Unit, Tenn. Technol. Univ., Cookeville 38501] Larval fish were collected bi-weekly at five main channel sites of Center Hill Reservoir from May through August 1978 to assess spatial and temporal variations in abundance and species composition. Larval /Dorosoma/ spp., /Lepomis/ spp., and /Pomoxis/ spp. comprised over 97 percent of all specimens collected. Analysis of variance indicated that /Dorosoma/ abundance varied significantly between sample sites, but density was not related to an upstream-downstream gradient within the reservoir. /Lepomis/ and /Pomoxis/ showed significant spatial differences in abundance within some sample periods, but low catch rates during several periods made overall analyses inconclusive. Localized variations in spawning stocks, water quality, or other environmental factors appear to have been more important regulators of larval fish density than upstream distance from the dam.

79-002013 Kulkarni, C. V.; Ogale, S. N. FEEDING, GROWTH AND EARLY DEVELOPMENT OF THE INDIAN TROUT, /BARILIUS (OPSARIUS) BOLA/ HAM. J. Bombay Nat. Hist. Soc. 75 (2): 266-272. Aug. 1978. SFA 24(3)
B/4 Shardoshram, B. Shankar Road, Bombay-400 028, India] Study of feeding habits, growth and early development of the Indian trout, /Barilius (Opsarius) bola/ Ham, which was introduced in the Lonavla lakes near Poona, indicates that it is a carnivorous fish thriving largely on small fish such as /Rasbora/, /Chela/, /Oxygaster/, /Danio/, etc. In lakes it grows to about 620 g. in 27 months and breeds in the third year. The male develops rough, tubercled scales on the sides and bright coloration on fins during breeding season which begins early in the monsoon. On hypophysation and stripping, the fertilised eggs took about 65 hours to hatch. The hatchlings had medium sized yolk sac and were comparatively more active than those of major carps and started swimming very soon. The post-larva developed chromatophores only on the fourth day and started feeding on minute /Moina/ etc. On the seventh day it reached 8 mm length and on 18th day a well-grown 18 mm fry stage.

79-002014 Love, M. S. ASPECTS OF THE LIFE HISTORY OF THE OLIVE ROCKFISH, /SEBASTES SERRANOIDES/. Ph.D. dissertation, Univ. Calif. (Santa Barbara) 195p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5195. May 1979. SFA 24(3)
I investigated the movements of the olive rockfish, /Sebastes serranoides/, off Santa Barbara, California, using both mechanical and parasite tags. Movements were very restricted over shallow reefs though somewhat less so around deeper oil platforms. Limited movements may contribute to over fishing, as comparisons of olive rockfish size

79-002014 CONTINUED
frequencies between two reefs indicates that fishing pressure has reduced olive rockfish populations to almost all prereproductive individuals on the more heavily fished site. I discuss movements of other rockfish and suggest potential management problems and solutions. Age and growth relations, reproduction and food habits of the olive rockfish were also studied. Olive rockfish grew at a faster rate off Avila than Santa Barbara. Evidence from laboratory studies indicate this differential may be due to ambient temperature. Females grew at a faster rate and attained a larger maximum size than males. Off Avila, spawning took place from December through March. Off Avila, fish mature between 4 and 8 years of age (total length 28-39 cm TL). Olive rockfish feed primarily on midwater nekton during both day and night, though nocturnal benthic feeding (on octopi) becomes increasingly important in larger individuals.

79-002015 Manion, P. J.; Smith, B. R. BIOLOGY OF LARVAL AND METAMORPHOSING SEA LAMPREYS, /PETROMYZON MARINUS/, OF THE 1960 YEAR CLASS IN THE BIG GARLIC RIVER, MICHIGAN, PART II, 1966-72. Great Lakes Fish Comm. Tech. Rep. no. 30. 35p. Oct. 1978. SFA 24(3)
[U.S. FWS, Twin Cities, MN 55111]

79-002016 May, B. E.; Leppink, J. d.; Wydoski, R. S. DISTRIBUTION, SYSTEMATICS AND BIOLOGY OF THE BONNEVILLE CUTTHROAT TROUT, /SALMO CLARKI UTAH/. Utah State Div. Wildl. Resour. Publ. No. 78-15. 26p. 1979. Available from Utah State Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116. SFA 24(3)
When white explorers first entered the Bonneville Basin they encountered a multitude of wildlife species. One organism which was paricularly noticeable was the resident trout /Salmo clarki utah/. These early explorers found cutthroat trout in nearly all aquatic environments encountered in their journeys through the Bonneville Basin drainage. Cutthroat trout found in area streams and lakes were descendants of a large spotted cutthroat that entered the Bear, Yellowstone and Colorado river drainages sometime prior to formation of Shoshone Falls, Idaho. Movement into the Bonneville Basin occurred with the diversion of Bear River into its present drainage system. Lake Bonneville provided an extremely large environment allowing the new cutthroat population to expand into areas of suitable habitat. Final desiccation of Lake Bonneville left many drainages isolated from each other and allowed for slight differences between the various populations. Within a short time following colonization of the Bonneville Basin, cutthroat populations began to decline. Lake populations were impacted by unregulated commercial fishing and stream populations were affected by irrigation diversions which dewatered many miles of stream channel. Nearly all populations were finally impacted by the introduction of non-native trout forms, particularly rainbow trout. This decline and replacement of cutthroat populations resulted in near extinction of the unique Bonneville cutthroat. Relic populations, however, have been located in a few small isolated streams in Utah, Wyoming and Nevada. These populations have developed in and adapted to these marginal habitats. Programs to protect these populations are being developed and use of this endemic cutthroat form in modern fisheries management is being evaluated. Many of the characteristics exhibited by Bonneville cutthroat may prove beneficial in developing additional fisheries in marginal waters.

79-002017 Meyer, T. L.; Cooper, R. A.; Langton, R. W. RELATIVE ABUNDANCE, BEHAVIOR, AND FOOD HABITS OF THE AMERICAN SAND LANCE, /AMMODYTES AMERICANUS/, FROM THE GULF OF MAINE. NOAA Fish. Bull. 77 (1): 243-253. Jan. 1979. SFA 24(3)

[NMFS, Woods Hole Lab., Woods Hole, MA 02543] Meristic characteristics of sand lance taken from Stellwagen Bank indicated the species to be the American sand lance, /Ammodytes americanus/. Bottom trawl data, ichthyoplankton surveys, and diver and submersible observations demonstrated a significant increase in relative abundance of sand lance since about 1975 on Stellwagen Bank; this trend was typical of the Northwest Atlantic from Cape Hatteras, N.C., to the Gulf of Maine. School shapes were constant in appearance, vertically compressed, tightly compacted, and bluntly linear from a dorsal and ventral view. School strengths varied from about 100 to tens of thousands of individuals with the nearest-neighbor distance ranging from 1/4 to 1 and 1/2 body lengths. The swimming motion is sinusoidal in form and eellike in appearance. Swimming speeds varied from 15 to over 120 cm/s. Copepods were the most important food source, constituting 41 percent of the total weight of food consumed; sand lance feed in school formation between midwater and the surface. Sand lance bury themselves totally or partially in clean sandy substrates when not schooling.

79-002018 Moller, P.; Serrier, J.; Belbenoit, P.; Bush, S. NOTES ON ETHOLOGY AND ECOLOGY OF THE SWASHI RIVER MORMYRIDS (LAKE KAINJI, NIGERIA). Behav. Ecol. Sociobiol. 4 (4): 357-368. 1979. SFA 24(3)

[Hunter Coll., City Univ. N.Y., New York]

79-002019 Moos, R. E. MOVEMENT AND REPRODUCTION OF SHOVELNOSE STURGEON, /SCAPHIRHYNCHUS PLATORYNCHUS/ (RAFINESQUE) IN THE MISSOURI RIVER, SOUTH DAKOTA. Ph.D. dissertation, Univ. S. Dak. 216p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5196. May 1979. SFA 24(3)

Average distances moved by shovelnose recaptured in one-year time blocks over 5 years were 3.1, 13.7, 51.0, 25.7, and 107.3 km. A few shovelnose were recaptured near St. Joseph, Missouri, 500-540 km downstream and several were recaptured near Omaha, Nebraska, 240-250 km downstream. Upstream movement was limited by Gavins Point Dam 47 km upstream of the study area. Several tagged shovelnose were at large more than 4 years and one was recaptured 8 years 188 days after its release. Tagged sturgeon displaced from their original capture location did not exhibit homing. The spawning season began in late May and continued through June, but all shovelnose did not spawn annually. About 65-70 percent of the mature males spawned in a given year and an estimated 30 percent were spawning annually. Most female shovelnose were apparently on a 2- or 3-year reproductive cycle. Attempts to locate spawning grounds were unsuccessful, but catches from various habitats using several gear types suggested that shovelnose may spawn in or near the main channel.--From abstr.

79-002020 Munroe, T. A.; Lotspeich, R. A. SOME LIFE HISTORY ASPECTS OF THE SEABOARD GOBY (/GOBIOSOMA GINSBURGI/) IN RHODE ISLAND. Estuaries 2 (1): 22-27. Mar. 1979. SFA 24(3)

[Va. Inst. Mar. Sci., Gloucester Point, VA 23062] This paper represents the first report of adult /G. ginsburgi/ from Rhode Island waters since 1938. Gobies were collected only from subtidal shell communities in high salinity waters. Seaboard gobies eat a variety of benthic invertebrates but feed most heavily on harpacticoid copepods. Gravid females collected in July contained one size class of ova indicating a single spawning per season. Egg counts ranged from 1268 to 1977 per female. Larval densities indicate that peak spawning

79-002020 CONTINUED
occurs in July and suggest that /G. ginsburgi/ is more abundant in the Sakonnet River and nearby Narragansett Bay than previously reported.

79-002021 Olmsted, L. L.; Cloutman, D. G. LIFE HISTORY OF THE FLAT BULLHEAD, /ICTALURUS PLATYCEPHALUS/, IN LAKE NORMAN, NORTH CARCLINA. Trans. Am. Fish. Soc. 108 (1): 38-42. Jan. 1979. SFA 24(3)
[Duke Power Co., Environ. Lab., Rt. 4, Box 531, Huntersville, NC 28078]

79-002022 Page, G.; Magnin, E. QUELQUES ASPECTS DE LA BIOLOGIE DU MENE A NAGEOIRES ROUGES /NOTROPIS CORNUTUS/ (MITCHILL) D'UN LAC DES LAURENTIDES AU QUEBEC. [SOME ASPECTS OF THE BIOLOGY OF THE COMMON SHINER /NOTROPIS CORNUTUS/ (MITCHILL) IN THE LAURENTIAN LAKES OF QUEBEC.] Nat. Can. (Que.) 105 (5): 301-308. Sept.-Oct. 1978. In French with English summ. SFA 24(3)
[Dep. Sci. Biol., Univ. Montreal, Case post. 6128, Succursale A Montreal, H3C 3J7, Canada] The growth of the common shiner /Notropis cornutus/ (Mitchill) has been studied by two methods: a graphical analysis of polymodal frequency distributions of fish lengths and annuli formation on scales. The five year old males measure 93 mm and weigh 8 g; the females of the same age measure 75 mm and weigh 3.5 g. These cyprinids have a lower growth rate than those found in Ontario and the United States. They are sexually mature at three years of age. The spawning occurs near the end of May or the beginning of June. A female produces between 100 and 350 eggs. Marking experiments have shown that the number of individuals aged two years and over is approximately 8,000, and that they have a tendency to remain close to the two main tributaries of the lake.

79-002023 Pathak, S. C. LENGTH-WEIGHT RELATIONSHIP, CONDITION FACTOR AND FOOD STUDY OF /LABEO CALBASU/ (HAMILTON) FROM IONI RESERVOIR (M.P.). J. Inland Fish. Soc. India 7: 58-64. Dec. 1975. SFA 24(3)

79-002024 Patnaik, S. SOME ASPECTS OF THE FISHERY AND BIOLOGY OF THE CHILKA KHORANTI, /RHABDOSARGUS SARBA/ (FORSKAL). J. Inland Fish. Soc. India 5: 102-114. Dec. 1973. SFA 24(3)

79-002025 Rangaswamy, C. P. STUDIES ON THE AGE AND GROWTH AND FOOD HABITS OF THE GREY MULLET, /MUGIL CEPHALUS/ LINNAEUS OF THE LAKE PULICAT. J. Inland Fish. Soc. India 5: 9-22. Dec. 1973. SFA 24(3)
Age and growth of /Mugil cephalus/ was studied by the analysis of scales and length frequency distribution. Growth of the fish conforms to the von Bertalanffy's growth equation and could be expressed as $l(t) = 831.04[1-e$ to the $-0.2139(t + 0.405)]$. The length-weight relationship is also described. The stomach contents were composed of a mixture of sand grains, decayed organic matter, diatoms, dinoflagellates, Foraminifera, algae, and some miscellaneous items like the fragments of copepods. Comparison of the species from the Adyar and Ennore estuaries with that of Lake Pulicat showed that the food and feeding habits of the species are more or less same in all these 3 environments.

79-002026 Rasmussen, K. UDBREDEISE CG FCIEEIOLCGI HOS BRAKVANDSHELTEN, /CCREGCNUS LAVARETUS/ (L.) I NISSUM FJCRD. [DISTRIBUTION AND FEEDING BIOLCGY CF THE BRACKISH WATER WHITEFISH /CCREGONUS LAVARETUS/ (L.) IN THE NISSUM FJCRD.] Medd. Ferskvandsfiskerilab. Dan. Fisk.-Havunders. 1/79. 18p. 1979. In Danish with English summ. SFA 24(3)
[Dan. Fisk.-Havunders. Ferskvandsfiskerilab., Lysbrogade 52 DK., 8600 Silkeborg, Denmark]

79-002027 Sigler, W. F.; Workman, G. W. THE BONNEVILLE CISCO OF BEAR LAKE. Utah Agric. Exp. Stn. Res. Rep. 33. 34p. May 1978. SFA 24(3)
[W. F. Sigler & Assoc., Inc., Logan, UT 84321] The Bonneville cisco, indigenous to Bear Lake, is the most numerous fish in this oligotrophic high mountain lake. Life history of the Bonneville cisco is explored under nine headings. Early exploration, history and geology, and hydrology of Bear Lake are covered.

79-002028 Sturgess, J. A.; Moyle, P. B. BIOLOGY OF RAINBOW TROUT (/SALMO GAIRDNERI), BROWN TROUT (/S. TRUTTA/) AND INTERIOR DOLLY VARDEN (/SALVELINUS CONFLUENTUS/) IN THE MCCLOUD RIVER, CALIFORNIA, IN RELATION TO MANAGEMENT. Cal-Neva Wildl. Trans. p. 239-250. 1978. SFA 24(3)
[Div. Wildl. Fish. Biol., Univ. Calif., Davis 95616] Movements, growth, age structure, and condition of rainbow trout, brown trout, and interior Dolly Varden in the lower McCloud River, California, were studied in the summer of 1974, in order to determine the best management strategy for a section of stream previously closed to the public, and containing trout populations unique to California. The population of native rainbow trout was found to be largely resident, while the non-native brown trout spent only the first 2 or 3 years of their life in the river before migrating downstream to Shasta Reservoir. Brown trout return to spawn at age IV and older. Growth in the river for both species is somewhat slow compared to other populations in the western United States, but growth in the reservoir for brown trout is rapid. Both species have condition factors typical for the species and both experience mid-summer depressions in condition, apparently related to reduced food availability. Dolly Varden were found to be extremely rare and only two fish were examined. It is likely that the Dolly Varden is non-migratory and slow-growing in the McCloud River. Following the study, special angling regulations were adopted to preserve the integrity of the native trout populations. Future management needs are discussed.

79-002029 Targett, T. E. A CONTRIBUTION TO THE BIOLOGY OF THE PUFFERS /SPHOEROIDES TESTUDINEUS/ AND /SPHOEROIDES SPENGLERI/ FROM BISCAYNE BAY, FLORIDA. NOAA Fish. Bull. 77 (1): 292-295. Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Me., Orono 04473]

79-002030 Wells, A. W. NOTES ON THE LIFE HISTORY OF THE CALIFORNIA CLINGFISH, /GOBIESOX RHESSODON/ (GOBIESOCIFORMES, GOBIESOCIDAE). Calif. Fish Game 65 (2): 106-110. Apr. 1979. SFA 24(3)
[Ichthyological Assoc. Inc., 100 A. Cass St., Middletown, DE]

79-002031 Wilk, S. J. BIOLOGICAL AND FISHERIES DATA ON WEAKFISH, /CYNOSCION REGALIS/ (BLOCH AND SCHNEIDER). U.S. Dep. Commer. Natl. Mar. Fish. Serv. Sandy Hook Lab. Tech. Ser. Rep. No. 21. x + 49p. Feb. 1979. SFA 24(3)
[NMFS, Sandy Hook Lab., Highlands, NJ]

POPULATION STUDIES, PRODUCTION, ETC.

79-002032 Anderson, E. D. ASSESSMENT OF THE NORTHWEST ATLANTIC MACKEREL, /SCOMBER SCOMBRUS/, STOCK. NOAA Tech. Rep. NMFS SSRF- 732. iv + 13p. Apr. 1979. SFA 24(3)
[NMFS, Woods Hole Lab., Woods Hole, MA 02543] The status of the Atlantic mackerel, /Scomber scombrus/, stock in the International Commission for the Northwest Atlantic Fisheries (ICNAF) convention area is analyzed in this paper. Total catch declined from a high of 431,606 t in 1972 to an estimated 92,000 t in 1977. The U.S. spring bottom trawl survey has shown a continuous decrease in Atlantic mackerel abundance since 1968. Fishing mortality (F) in 1977 was estimated at 0.39, nearly one-half of the 1976 level and the lowest since 1972. The 1974 year class appears to be the strongest since 1969, whereas the 1975 and 1976 year classes appear to be very weak. Spawning stock biomass decreased from 1.8 million t in 1970-72 to an estimated 402,500 t at the beginning of 1978, which is slightly below the 1962-67 level when catches averaged only about 25,000 t. A zero catch in 1978 would increase the 1979 spawning stock by 6 percent; a catch of 23,500 t (F = 0.07) would maintain the spawning stock at the 1978 level.

79-002033 Argue, A. W.; Patterson, L. M.; Armstrong, R. W. TRAPPING AND CODED-WIRE TAGGING OF WILD COHO, CHINOOK AND STEELHEAD JUVENILES FROM THE COWICHAN-KOKSILAH RIVER SYSTEM, 1976. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 850. vi + 117p. Mar. 1979. In English with French summ. SFA 24(3)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

79-002034 Dommasnes, A. LODDEUNDERSOKELSER I BARENTSHAVET I JUNI-JULI 1978. [CAPELIN INVESTIGATIONS IN THE BARENTS SEA IN JUNE-JULY 1978.] Fisken Havet 1978 (4): 49-64. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway] During the period 21 June - 15 July 1978 investigations were carried out on the Barents Sea capelin stock. Capelin larvae were caught with a Gulf III plankton sampler, and an acoustic survey was made of 1 year and older capelin. The capelin stock was smaller than it had been the preceeding summers. The 2 years old capelin were very numerous, but very small quantities of 1 year old capelin were recorded. Geographical distribution and length frequency is shown for each yearclass. Hydrographical conditions are briefly discussed.

79-002035 Hankin, D. G. STOCK AND RECRUITMENT IN LABORATORY FISH POPULATIONS. Ph.D. dissertation, Cornell Univ. 197p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1610. Oct. 1978. SFA 24(3)

79-002036 Kempinger, J. J.; Christensen, L. M. POPULATION ESTIMATES AND STANDING CROPS OF FISH IN NEBISH LAKE. Wis. Dep. Nat. Resour. Res. Rep. 96. 12p. Mar. 1978. SFA 24(3)

[Rt. 1, Box 248-K, Woodruff, WI 54568] Nebish Lake was treated with a fish toxicant 3 October 1966 to remove all fish and prepare the lake for a subsequent study of a re-introduced two-species fish population (smallmouth bass and yellow perch). Populations of each species were estimated and standing crop was calculated by the mark-and-recapture method. The standing crop of fish was 210 lb/acre. Minnows alone made up 135 lb/acre and accounted for 64 percent of the total weight of all fish. The walleye was the major game fish species present, comprising 10.8 lb/acre and 5.1 percent of the total weight. The yellow perch was the primary panfish species, accounting for 29 lb/acre and 13.8 percent of the total weight. The study is unique in that: (1) Nebish Lake was not a "problem lake", a type from which most of Wisconsin's standing crop data have originated, (2) the estimates are more detailed, by species and age or size interval, compared to available data on other waters, and (3) the estimate of the minnow population, found to be very high, is a "first" in Wisconsin.

79-002037 Landau, R. GROWTH AND POPULATION STUDIES ON /TILAPIA GALILAEA/ IN LAKE KINNERET. Freshwater Biol. 9 (1): 23-32. Feb. 1979. SFA 24(3)

[Israel Oceanogr. Limnol. Res. Ltd., Tel-Shikmona, P.O.B. 8030, Haifa, Israel] Between 1967 and 1977, catches of /Tilapia galilaea/ in Lake Kinneret fell from an annual average of about 200 tonnes to a low of 70 tonnes in 1974, and then returned to their former level. Total yearly mortality (Z) was estimated at 1.84 between 1970 and 1976. Assuming a natural mortality (M) of 0.94, total stock size averaged 300-700 tonnes in that period, while recruitment averaged less than 0.7-3 million per year. Three broods hatched in years of relatively high water levels (1970, 1971 and 1972) yielded especially low recruitment. The Von Bertalanffy growth coefficient (K) was estimated at 0.67, and final length at 25-36 cm total length. First year's growth, 23-152 mm, was closely related to final length, which appeared to be affected by genetic variation in the population. Yearly fluctuations in size distribution were attributed to changes in the proportions of fast- and slow-growers, as well as in the abundance of year-classes. Recruitment to the fishery, at 17-20 cm, occurred between ages 1+ and 3+. The highest growth rates for age-1 /T. galilaea/, 1-2 percent mean weight per day, occurred in April and May, the /Peridinium/ season. However, only a small proportion of age-1 fish reached marketable size by July, when their food supply began to diminish. During the autumn months, there was hardly any length increment, and all /T. galilaea/ became lean, especially the age-0 group. It is surmised that recruitment of stocked fish could be increased by introduction in December and by use of fingerlings which are potentially able to grow to marketable size in less than two seasons.

79-002038 Moring, J. R. AGE STRUCTURE OF A TIDEPOOL SCULPIN, /OLIGOCOTTUS MACULOSUS/, POPULATION IN NORTHERN CALIFORNIA. Calif. Fish Game 65 (2): 111-113. Apr. 1979. SFA 24(3)
[Oreg. Dep. Fish Wildl., 303 Extension Hall, Oreg. State Univ., Corvallis 97331]

79-002039 Naiman, R. J.; Sibert, J. R. DETRITUS AND JUVENILE SALMON PRODUCTION IN THE NANAIMO ESTUARY: III. IMPORTANCE OF DETRITAL CARBON TO THE ESTUARINE ECOSYSTEM. J. Fish. Res. Board Can. 36 (5): 504-520. May 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002040 Ni, I-H. COMPARATIVE FISH POPULATION STUDIES. Ph.D. dissertation, Univ. British Columbia 1978. From Diss. Abstr. Int. B Sci. Eng. 39(9):4176. Mar. 1979. SFA 24(3)

79-002041 Nielsen, L. A. MECHANISMS REGULATING RECRUITMENT OF JUVENILE YELLOW PERCH (/PERCA FLAVESCENS/) TO THE ADULT STOCK IN ONEIDA LAKE, NEW YORK. Ph.D. dissertation, Cornell Univ. 80p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(8):3615. Feb. 1979. SFA 24(3)
The abundance of 12 year classes of yellow perch (/Perca flavescens/) in Oneida Lake, New York, was estimated at intervals between ages 0 and II from catch and area swept by trawls. Ranking of perch year classes with respect to abundance changed between the end of the first growing season and recruitment to the reproductive stock at age III, suggesting that ultimate year-class strength was strongly influenced by mortality between ages I and II. Predation by walleye was probably the principal cause of mortality of age I and II perch. Although frequency of occurrence of age I and II perch in stomachs of walleye was low, several lines of evidence suggested that density of juvenile perch was also low and that walleye consumed a high proportion of each perch cohort. In most years, the majority of walleye predation on age I and II perch occurred in May and June, before walleye began to prey on age 0 yellow perch. Using regression analysis, it was revealed that mortality of perch between ages I and II was related to mean length and density of the year class at the end of the first year and density of alternate prey during the second growing season. These three factors explained 85 percent of the variation in mortality of juvenile perch for 12 year classes. Mortality rates influenced by perch length and abundance of alternate prey, both of which are independent of perch density, resulted in year classes which differed 100-fold in relative abundance at age III. Change in the relative abundance of cohorts at ages I and II contradicts the generalization that year-class strength is fixed during a critical period early in life.

79-002042 Otte, G. DER FISCHBESTAND IM QUELLGEBIET EINES FLACHLAND-FORELLEN-BACHES. [THE FISH STOCK IN THE HEADWATERS OF A LOWLAND TROUT STREAM.] Arch. Fischereiwiss. 29 (3): 133-139. Mar. 1979. In German with English summ. SFA 24(3)
[Biol. Anstalt Helgoland, Zent. Hamburg, Palmaille 9, D-2000 Hamburg 50, West Germany] Fish species composition, abundance, and biomass in the headwaters of a small trout stream of Northern Germany was investigated. The fish stock was composed of /Salmo trutta f. fario/ (51 percent), /Lampetra planeri/ (44.3 percent) and /Anguilla anguilla/ (4.7 percent). Highest population density was 11,453 individuals per ha with a weight of 72 kg. Trout- and lamprey-populations consisted of two year-classes. The distribution of the fish fauna in the stream depended mainly on the natural food supply.

79-002042 CONTINUED
Stream correction in one part of the trout stream resulted in an almost complete extermination of the fish- and invertebrate-populations.

79-002043 Parrish, R. H.; MacCall, A. D. CLIMATIC VARIATION AND EXPLOITATION IN THE PACIFIC MACKEREL FISHERY. Calif. Dep. Fish Game Fish Bull. 167. 110p. 1978. SFA 24(3)
[NMFS, Monterey, CA]

79-002044 Reich, K. A POSSIBLE CORRELATION BETWEEN AIGAI NUMBER AND /S. GALILAEUS/ YIELD IN THE KINNERET. Bamidgeh 30 (4): 116-117. Dec. 1978. SFA 24(3)
[Hebrew Univ., Dep. Zool., Jerusalem, Israel]

79-002045 Reinhardt, R.; MacKinnon, C. N. QUINSAM RIVER: 1975 DOWNSTREAM ENUMERATION AND WILD COHO SMOLT MARKING. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 840. iii + 27p. Feb. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 1090 W. Pender St., Vancouver, BC V6E 2P1, Canada]

79-002046 Rideout, S. G.; Johnson, J. E.; Cole, C. F. PERIODIC COUNTS FOR ESTIMATING THE SIZE OF THE SPAWNING POPULATION OF ALEWIVES, /ALOSA PSEUDOHARENGUS/ (WILSON). Estuaries 2 (2): 119-123. June 1979. SFA 24(3)
[U.S. FWS, Newton Corner, MA 02158] The number of migrating alewives in the Parker River, Massachusetts, can be counted visually by standing at the upper end of each of the 6 fish ladders in the system. Estimating the entire run of up to a month's duration by this procedure is not economically feasible, but we suggest a subsampling procedure that can provide sufficient accuracy and be economical. The reliability of periodic sample counts when used to estimate population numbers of anadromous alewives (/Alosa pseudoharengus/) was indicated by the low variance of paired counts, small random errors of individual counts, and by the low variability between counts on days of large runs in the Parker River. Analyses of computer-simulated runs using actual data suggested that short counts taken frequently are superior to longer counts taken less often. Both field and computer-simulated data suggested that ten-minute counts taken hourly will estimate the true population of alewife runs within 10 percent error at the .05 level of probability.

79-002047 Schneider, J. C.; Leach, J. H. WALLEYE STOCKS IN THE GREAT LAKES, 1800-1975: FLUCTUATIONS AND POSSIBLE CAUSES. Great Lakes Fish. Comm. Tech. Rep. no. 31. 51p. Feb. 1979. SFA 24(3)
[Mich. Dep. Nat. Resour., Inst. Fish. Res., Ann Arbor 48109]

79-002048 Sjoblom, V.; Parmanne, R. ABUNDANCE OF SPRAT EGGS AND LARVAE IN THE NORTHERN BALTIC IN 1977. Int. Counc. Explor. Sea. C.M. 1978/J:18. 5p. 1978. In English with French summ. SFA 24(3)
[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

79-002049 Sjoblom, V.; Parmanne, R. ABUNDANCE OF BALTIC HERRING LARVAE IN THE SEAS AROUND FINLAND IN 1977. Int. Counc. Explor. Sea C.M. 1978/J:6. 6p. 1978. In English with French summ. SFA 24(3)
[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki, Finland]

79-002050 Smith, G. B. ECOLOGY AND DISTRIBUTION OF MID-EASTERN GULF OF MEXICO REEF FISHES. Ph.D. dissertation, Univ. South Fla. 268p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(2):510. Aug. 1978. SFA 24(3)

79-002051 Sunder, S. A NOTE ON THE CATCHES OF /CROSSOCHEILUS LATIUS/ (HAMILTON) IN COMMERCIAL LANDINGS OF DAL LAKE, SRINAGAR, KASHMIR DURING 1969-71. J. Inland Fish. Soc. India 8: 149-150. Dec. 1976. SFA 24(3)

79-002052 Symons, P. E. K. ESTIMATED ESCAPEMENT OF ATLANTIC SALMON (/SALMO SALAR/) FOR MAXIMUM SMOLT PRODUCTION IN RIVERS OF DIFFERENT PRODUCTIVITY. J. Fish. Res. Board Can. 36 (2): 132-140. Feb. 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Ocean, Resour. Serv. Br., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002053 Tarplee, W. H., Jr. ESTIMATES OF FISH POPULATIONS IN TWO NORTHEASTERN NORTH CAROLINA SWAMP STREAMS. Brimleyana no. 1. p. 99-112. Mar. 1979. SFA 24(3)
[Carolina Power & Light Co., P.O. Box 1551, Raleigh, NC 27602] Fish populations were sampled in two northeastern North Carolina swamp streams, Duke and Hoggard Mill Creek, from May through August 1972. Water conditions permitted partitioning the streams into 0.4 km sections with nets, and estimating the abundances of 30 species in randomly chosen areas using the Petersen method. Some biomass estimates were also made. Population estimates in Duke Swamp varied from 6630 to 33,734 fish per surface hectare. In Hoggard Mill Creek estimated numbers ranged from 17,656 to 103,891 fish per surface hectare. Large variations were found in numbers of fish among sections of stream, but these variations were not uniform from species to species. Biomass estimates ranged from 195 kg to 1607 kg of fish per surface hectare for the two streams.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

79-002054 Bhanot, K. K. OBSERVATIONS ON THE SPAWNING OF /HILSA ILISHA/ (HAMILTON) IN THE HOOGHLY ESTUARY. J. Inland Fish. Soc. India 5: 50-54. Dec. 1973. SFA 24(3)

79-002055 Brown, I. P. POLYGAMY, FEMALE CHOICE, AND THE MOTTLED SCULPIN, /COTTUS BAIRDI/. Ph.D. dissertation, Ohio State Univ. 181p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1658. Oct. 1978. SFA 24(3)

79-002056 Bruton, M. N. THE BREEDING BIOLOGY AND EARLY DEVELOPMENT OF /CLARIAS GARIEPINUS/ (PISCES: CLARIIDAE) IN LAKE SIBAYA, SOUTH AFRICA, WITH A REVIEW OF BREEDING IN SPECIES OF THE SUBGENUS /CLARIAS/ (CLARIAS). Trans. Zool. Soc. Lond. 35 (1): 1-45. May 1979. SFA 24(3)
[J. L. B. Smith Inst. Ichthyol., Rhodes Univ., Grahamstown, South Africa]

79-002057 Cohen, S.; McFarland, D. TIME-SHARING AS A MECHANISM FOR THE CONTROL OF BEHAVIOUR SEQUENCES DURING THE COURTSHIP OF THE THREE-SPINED STICKLEBACK (/GASTEROSTEUS ACULEATUS/). Anim. Behav. 27 (1): 270-283. Feb. 1979. SFA 24(3)
[Dep. Biol., SUNY, Stony Brook, NY] The male stickleback (/Gasterosteus aculeatus/) alternates between activities directed towards the female and activities directed towards his nest during courtship. The hypothesis that a time-sharing mechanism can control the allocation of time to these two classes of activities was tested using the double interruption method. It was found that either nest or female related behaviours could be dominant, as measured by the behaviour that most frequently followed an interruption. The effect of interrupting subdominant behaviour was realted to both the length of the interruption and the distribution of uninterrupted visit lengths. The effect of interrupting dominant behaviour was independent of these factors. Disrupting the nest with snails altered the timing of behaviour only during nest dominant sessions. All these results are consistent with the time-sharing hypothesis. In addition, dominance was found to be related to other behavioural measures of the motivational state of the animal. The relevance of this to the classical disinhibition interpretation of the performance of nest activities is discussed.

79-002058 Courtois, L. A.; Bino, S. EGG DEPOSITION OF THE DESERT PUPFISH, /CYPRINODON MACULARIUS/, IN RELATION TO SEVERAL PHYSICAL PARAMETERS. Calif. Fish Game 65 (2): 100-105. Apr. 1979. SFA 24(3)
[Calif. Dep. Fish Game, 987 Jedsmith Dr., Sacramento 95819] The effects of spawning mop color, salinity, and water depth on the reproduction of the desert pupfish were examined. Green spawning mops were most frequently used for egg deposition. More eggs were deposited by fish acclimated to 5 0/00 salinity than those at 15 0/00. Fish acclimated to 5 0/00 used the deepest portion (37 cm) of their tank for egg deposition significantly more than other depths. Fish acclimated to 15 0/00 utilized the intermediate depth (22 cm) for egg deposition significantly more than other available depths.

79-002059 Dietrich, C. S., Jr. FECUNDITY OF THE ATLANTIC MENHADEN, /BREVOORTIA TYRANNOS/. NOAA Fish. Bull. 77 (1): 308-311. Jan. 1979. SFA 24(3)
[NMFS, P.O. Box 570, Beaufort, NC 28516]

79-002060 Durbin, A. G.; Nixon, S. W.; Oviatt, C. A. EFFECTS OF THE SPAWNING MIGRATION OF THE ALEWIFE, /ALOSA PSEUDOHARENGUS/, ON FRESHWATER ECOSYSTEMS. Ecology 60 (1): 8-17. Feb. 1979. SFA 24(3)
[Grad. Sch. Oceanogr., Univ. R.I., Kingston 02881] The influx of large numbers of alewife, /Alosa pseudoharengus/, into relatively small freshwater systems may have a considerable impact upon pre-established food chains and nutrient cycles. We estimate the total nutrient input to Pausacaco Pond, Rhode Island, USA, from alewives amounted to 0.43 g P, 2.7 g N, and 16.8 g C/m^2 over a 2-mo period. This is largely through mortality of the spawning fish, and to a

79-002060 CONTINUED
lesser extent through excretion. These inputs were much greater than the eventual nutrient loss to the system through emigration of juvenile fish. In tank experiments using pond microcosms, the initial response to the addition of the fish was a large phytoplankton bloom and an increase in litter respiration. The phytoplankton bloom was short-lived, and the most lasting effect was an increase in production and respiration in the leaf litter. This increased production in the litter community would support a long lasting supply of insect and benthic invertebrate food for young fish. The respiration rate of autumn leaves incubated in alewife streams during the migration was significantly higher than that of leaves incubated simultaneously in a stream which had no alewife run. Respiration rates of leaves incubated in the same streams before the arrival of alewives did not differ significantly. The increase in litter respiration, an indication of microbial and invertebrate activity on the leaf surface, was attributed to the additional nutrients supplied by the fish.

79-002061 Finucane, J. H.; Collins, L. A.; Barger, L. E. SPAWNING OF THE STRIPED MULLET, /MUGIL CEPHALUS/, IN THE NORTHWESTERN GULF OF MEXICO. Northeast Gulf Sci. 2 (2): 148-150. Dec. 1978. SFA 24(3)
[NMFS, 3500 Delwood Beach Rd., Panama City, FL 32407]

79-002062 Foott, J. SALMON EGGS. Oceans 12 (2): 33-35. Mar.-Apr. 1979. SFA 24(3)

79-002063 Hawke, S. P. STRANDED REDDS OF QUINNAT SALMON IN THE MATHIAS RIVER, SOUTH ISLAND, NEW ZEALAND. N.Z. J. Mar. Freshwater Res. 12 (2): 167-171. June 1978. SFA 24(3)
[Fish. Res. Div., Minist. Agric. Fish., Private Bag, Christchurch, New Zealand] In May and June 1974 seven naturally made, stranded redds of quinnat salmon /Oncorhynchus tshawytscha/ (Walbaum) were excavated. Ova numbers per redd varied from 2295 to 6510 and per egg pocket from 99 to 1608. Egg pocket depths varied from 18 cm to 43 cm. The ova were found to be healthy.

79-002064 Karamchandani, S. J.; Pandit, P. K. ON THE OCCURRENCE AND BREEDING OF /LABEO ROHITA/ (HAMILTON) IN A SECTION OF NARBADA RIVER IN GUJARAT STATE. J. Bombay Nat. Hist. Soc. 72 (1): 215-217. 1975. SFA 24(3)

79-002065 Kirschbaum, F. REPRODUCTION OF THE WEAKLY ELECTRIC FISH /EIGENMANNIA VIRESCENS/ (RHAMPHICHTYIDAE, TELEOSTEI) IN CAPTIVITY. I. CONTROL OF GONADAL RECRUDESCENCE AND REGRESSION BY ENVIRONMENTAL FACTORS. Behav. Ecol. Sociobiol. 4 (4): 331-355. 1979. SFA 24(3)
[Zool. Inst. Univ., Lehrstuhl I, Weyertal 119, D-5000 Koln 41, West Germany]

79-002066 Kowtal, G. V. OBSERVATIONS ON THE BREEDING AND LARVAL DEVELOPMENT OF CHILKA 'SAHAI' /ELEUTHERONEMA TETRADACTYLUM/ (SHAW). Indian J. Fish. 19: 70-75. 1972. SFA 24(3)
/Eleutheronema tetradactylum/ (Shaw) breeds in the Chilka lake in the northern zone in the Tua Nali area during January-June period as evidenced by the collection of eggs and larvae and mature and spent specimens. On the west coast of India it has two spawning seasons, one in January-April and the other in July-September. The Chilka 'sahai' possibly undertakes movements from lake to sea for the second spawning season in July-September and returns to the lake after spawning.

79-002066 CONTINUED
However this needs confirmation.

79-002067 Kuo, C.-M.; Nash, C. E. ANNUAL REPRODUCTIVE CYCLE OF MILKFISH, /CHANOS CHANOS/ FORSKAL, IN HAWAIIAN WATERS. Aquaculture 16 (3): 247-251. Mar. 1979. SFA 24(3)
[Oceanic Inst., Waimanalo, HI 96795] The monthly mean values of gonadosomatic index (GSI) over a continuous 36-month period show that the population of milkfish, /C. chanos/ Forskal, in Hawaiian waters has a short breeding season between June and August. In these months, the GSIs of the mature individual males are between 3.19 and 5.36 percent, and of the mature individual females between 7.07 and 9.76 percent. These figures plus histological data suggest a synchronous spawning behavior for the species. Mature oocytes (stage III) are larger than 0.7 mm in diameter, which increases to about 1.2 mm at the time of ovulation and about 1.35 mm at the time of spawning.

79-002068 Kuznetsov, V. A.; Khalitov, N. Kh. ALTERATIONS IN THE FECUNDITY AND EGG QUALITY OF THE ROACH, /RUTILUS RUTILUS/ IN CONNNECTION WITH DIFFERENT FEEDING CONDITIONS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 63-70. 1978. SFA 24(3)
[Dep. Invert. Zool., Kazan' Univ., USSR] Changes in absolute and relative fecundity, in the diameter and weight of eggs, in the fat content of the eggs and muscles in connection with different feeding conditions and different conditions preceding spawning, as well as with the biological indicators of female roach, /Rutilus rutilis/, are examined. It is shown that the roach population of Kuybyshev reservoir reacted to different feeding conditions primarily by a change in the indicators of absolute fecundity and of fat content of the eggs with relative stability of the mean values of weight and diameter of eggs. The adaptive significance of the reproductive process of the roach under conditions of regulated river flow is analyzed.

79-002069 Markle, D. F.; Wenner, C. A. EVIDENCE OF DEMERSAL SPAWNING IN THE MESOPELAGIC ZOARCID FISH /MELANOSTIGMA ATLANTICUM/ WITH COMMENTS ON DEMERSAL SPAWNING IN THE ALEPOCEPHALID FISH /XENODERMICHTHYS COPEI/. Copeia 1979 (2): 363-366. 18 May 1979. SFA 24(3)
[Huntsman Mar. Lab., St. Andrews, NB E0G 2X0, Canada]

79-002070 Marshall, B. E. OBSERVATIONS ON THE BREEDING BIOLOGY OF /SAROTHERODON MACROCHIR/ (BOULENGER) IN LAKE MCILWAINE, RHODESIA. J. Fish Biol. 14 (4): 419-424. Apr. 1979. SFA 24(3)
[Lake Kariba Fish. Res. Inst., P.O. Box 75, Kariba, Rhodesia] /Sarotherodon macrochir/ matures at 17-18 cm standard length in Lake McIlwaine and males grow larger than females. There is an extensive breeding season with the main breeding taking place during September-February, the hottest period of the year, which is just before the rainy season. Female /S. macrochir/ produce about 1000 to 5000 eggs in their ovaries and can brood up to 800 eggs in their mouths. Mean brooding efficiency is about 75 percent but this declines as the fish increase in size.

79-002071 Middaugh, D. P. REPRODUCTIVE ECOLOGY AND SPAWNING PERIODICITY OF THE ATLANTIC SILVERSIDE, /MENIDIA MENIDIA/ (LINNAEUS) (ATHERINIDAE, TELEOSTEI). Ph.D. dissertation, Univ. S.C. 98p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5216. May 1979. SFA 24(3)

79-002072 Nzioka, R. M. OBSERVATIONS ON THE SPAWNING SEASONS OF EAST AFRICAN REEF FISHES. J. Fish Biol. 14 (4): 329-342. Apr. 1979. SFA 24(3)

[Kenya Mar. Fish. Res. Organ., P.O. Box 81651, Mombasa, Kenya] Between 1974-1977 the gonads of a number of commercial reef fishes were examined during a study of gear improvement and stock assessment along the East African Coastal waters. Different methods of fishing ranging from modern methods of trawling to local methods of traps were used. Twenty-one families with a total of 73 species were examined. The spawning of these species occurred throughout the year with two peaks in January to March and September to November. The highest peak of breeding was in October, corresponding to the time of the South East Monsoons, and to the highest water temperature.

79-002073 Parameswaran, S.; Alikunhi, K. H.; Sukumaran, K. K. OBSERVATIONS ON THE MATURATION, FECUNDITY AND BREEDING OF THE COMMON CARP, /CYPRINUS CARPIO/ LINNAEUS. Indian J. Fish. 19: 110-124. 1972. SFA 24(3)

79-002074 Robertson, D. A. SPAWNING OF TARAKIHI (PISCES: CHEILODACTYLIDAE) IN NEW ZEALAND WATERS. N.Z. J. Mar. Freshwater Res. 12 (3): 277-286. Sept. 1978. SFA 24(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] Tarakihi /Cheilodactylus macropterus/ eggs are 0.90-1.00 mm in diameter and have a single oil droplet of 0.18-0.23 mm diameter. Eggs in surface plankton samples indicated spawning areas near East Cape, Kaikoura, and Fiordland. Hatching took 70 h at 18.5-20°C. Observations on rate of ascent and age of eggs suggested spawning occurs in midwater at night.

79-002075 Taylor, J. N. BEHAVIORAL COMPONENTS OF REPRODUCTIVE SUCCESS IN MALE SUNFISHES OF THE GENUS /LEPOMIS/. Ph.D. dissertation, Univ. Mich. 254p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(10): 4771. Apr. 1979. SFA 24(3)

79-002076 Taylor, M. H.; Leach, G. J.; DiMichele, L.; Levitan, W. M; Jacob, W. F. LUNAR SPAWNING CYCLE IN THE MUMMICHOG, /FUNDULUS HETEROCLITUS/ (PISCES: CYPRINODONTIDAE). Copiea 1979 (2): 291-297. 18 May 1979. SFA 24(3)

[Sch. Life Health Sci., Univ. Del., Newark 19711] Spawning in a natural population of the mummichog, /Fundulus heteroclitus/, occurs cyclically throughout its reproductive season. Gonadal maturity and spawning readiness of males and females are greatest for several days coincident with new or full moon. The spawning rhythm is apparent in size distribution of fry collected during the spawning season. A diurnal cycle in both spawning readiness and gonadal maturity was superimposed on the lunar spawning rhythm. Although mature eggs were found in the ovaries of fish examined during the day at spawning peaks, these eggs were usually dispersed throughout the stroma of the ovary. Fish sampled at the night high tide usually contained ovulated eggs grouped posteriorly in the lumen of the ovary, at the opening of the oviposito. This rhythmicity synchronizes spawning with the highest tides of the lunar cycle, and makes possible the deposition of

79-002076 CONTINUED
eggs in locations which insure their incubation away from strong tidal currents. the observed spawning rhythm is an important component of a reproductive sequence that appears to be of adaptive significance in the tide marsh environment.

79-002077 Verigin, B. V.; Zaki Mokhamed, M. I.; Mckhamed, Z. NATURAL SPAWNING OF THE SILVER CARP, /HYPOPHTHALMICHTHYS MOLITRIX/, THE BIGHEAD CARP, /ARISTICHTHYS NOBILIS/, AND THE GRASS CARP, /CTENOPHARYNGODON IDELLA/, IN THE SYR-DAR'YA RIVER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 143-146. 1978. SFA 24(3)
[Dep. Ichthyol., Moscow Univ., USSR]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

79-002078 Bailey, R.; Patula, D.; Green, M.; Weeks, R.; Iong, F. MIGRATORY BEHAVIOR OF LAHONTAN CUTTHROAT TROUT (/SALMO CLARKI HENSHAWI/) UTILIZING RADIO TELEMETRY. Cal-Neva Wildl. Trans. p. 127-136. 1978. SFA 24(3)
[U.S. FWS, Reno, NV] A significant difference in total upstream versus total downstream movement was found in 1976. No significant difference in total upstream versus total downstream movement was found in 1977. Water temperature is postulated as a key triggering mechanism in upstream spawning behavior.

79-002079 Graser, L. F. SPATIC-TEMPORAL DISTRIBUTION OF CLUPEID LARVAE IN BARKLEY RESERVOIR. IN R. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 120-138. 1979. SFA 24(3)
[Div. Water Resour., TVA, Norris, TN 37828] The spatic-temporal distribution patterns of clupeid larvae were described for a lotic area of Barkley Reservoir on the Cumberland River in 1976. Daytime clupeid catches were consistently higher than night catches. Peak clupeid densities for all larval size groups at the open water station (maximum bottom depth approximately 12 m), occurred at dusk in the upper strata (0-3 m). Day-night vertical distribution patterns were observed for even very small (2-5 mm) larvae. Evidence of a very abrupt cessation of clupeid spawning activity is presented and discussed. Turbidity, flow, temperature (i.e., thermocline), size, class, diel period (overall light intensity as well as rate of change) gear type, and tow speed can all contribute to the observed distributional patterns of larval clupeids.

79-002080 Haynes, J. M. MOVEMENT AND HABITAT STUDIES OF CHINOOK SALMON AND WHITE STURGEON. Ph.D. dissertation, Univ. Minn. 166p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(2):532. Aug. 1978. SFA 24(3)

79-002081 Jakobsen, T. MERKEFORSOK MED SEI PA SUNNMORE I NOVEMBER-DESEMBER 1974. [SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN COAST AT 62 30'N IN NOVEMBER-DECEMBER 1974.] Fisken Havet 1978 (3): 57-68. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway] In November-December 1974, 2499 young saithe were tagged and released in Norwegian coastal waters at about 62°30'N. By the end of 1976, 370 (14.8 percent) were reported recovered. The results showed that a mass migration to the North Sea took place around May-June 1975, and by the

79-002081 CONTINUED
end of the year virtually all the saithe had left the coastal waters. Recoveries outside the coastal area were made predominantly in the North Sea, and none were reported from north of 63°30'N. The size of the saithe when leaving the coastal waters, was about 35-40 cm and the age 3-4 years. A seasonal purse seine fishery for saithe in winter in the tagging area heavily exploits the local stock, but migration is the major reason for low abundance in periods of saithe longer than 35-40 cm in the area.

79-002082 Jakobsen, T. MERKEFORSOK MED SEI I NORD-NORGE NORD FOR LOFOTEN 1970-1974. [SAITHE TAGGING EXPERIMENTS IN NORTHERN NORWAY NORTH OF 68 N, 1970-1974.] Fisken Havet 1978 (3): 42-56. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway] In 1970-1974, 7913 saithe, predominantly immature, were tagged in northern Norway. By the end of 1976, 1204 tags (15.2 percent) were reported recaptured. Recaptures of spawning saithe in the North Sea were more frequent than in earlier experiments, whereas recaptures at Iceland were much less frequent than previously recorded. This may be a result of the decline of the stock of Atlanto-Scandian herring which used to be an important source of food for the spawning saithe.

79-002083 Jakobsen, T. MERKEFORSOK MED SEI PA STREKNINGEN MORE-SALTEN 1971-1974. [SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN COAST BETWEEN 62 N AND 67 N, 1971-1974.] Fisken Havet 1978 (3): 31-41. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway] In 1971-1974, 5222 young saithe were tagged on the Norwegian coast between 62°N and 67°N. By the end of 1976, 622 (12.7 percent) were reported recaptured. The results show an increasing tendency of a southward migration as the experiments are moved to the south. A 50-50 percent distribution of recaptures north and south of the tagging area seems normally to occur in experiments at about 65°N. There has apparently been a change in the migration pattern since the mid-1950ies when recaptures indicated a basically northward migration from areas at about 63°N.

79-002084 Jakobsen, T. MERKEFORSOK MED SEI PA VESTLANDET SOR FOR STAD 1972-1974. [SAITHE TAGGING EXPERIMENTS ON THE NORWEGIAN WEST COAST SOUTH OF 62 N, 1972-1974.] Fisken Havet 1978 (3): 15-30. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway] In 1972, 1973 and 1974, 6291 young saithe were tagged on the Norwegian west coast south of 62°N. By the end of 1976, 1094 (17.4 percent) were reported recaptured. Of these, 87.7 percent were found in the North Sea region. Of the saithe which had left the tagging area, 79.1 percent were recaptured in the North Sea and 17.3 percent on the Norwegian coast north of 62°N. Most of the recaptures in the North Sea were made north of 57°N and east of 2°E. The recovery rate was less than half of what would be expected from the exploitation rate on saithe in the North Sea region. This is caused partly by non-return and non-observation of tags and possibly by shedding, but the tagged saithe also seem to suffer a higher mortality rate than normal, in some cases shortly after tagging, but probably also over longer periods.

79-002085 May, B. E.; Gloss, S. P. DEPTH DISTRIBUTION OF LAKE POWELL FISHES. Utah State Div. Wildl. Resour. Publ. No. 78-1. ii + 19p. 1979. Available from Utah State Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116. SFA 24(3)

This study encompassed four years (1966-1969) of vertical and horizontal gill netting designed to determine vertical distribution of the major game fish species in Lake Powell in relation to oxygen and temperature profiles. Rainbow trout were captured in depths ranging from the surface to 180 ft (55m) and temperatures ranging from 44°F (7°C) to 80°F (27°C) with temperature preferences indicated between 50°F-70°F (10°-21°C). Largemouth bass showed a definite preference during the warmer months of temperatures above 70°F (21°C) and very strong avoidance of lowered oxygen concentrations at the thermocline. Bluegill and crappie occupied the shallower 10-20ft (3-18m) strata most of the year regardless of temperature regimes, though they appeared to range to greater depths during the colder months when the reservoir was not stratified. Most channel catfish were captured above 40ft (12m) with depths increasing as the summer progressed. Walleye did not demonstrate a well defined depth preference but appeared to prefer temperatures in excess of 70°F (21°C). Carp preferred the shallower depths with the warmer water temperatures while the flannelmouth sucker ranged widely between the surface and 130 ft (40 m).

79-002086 Neves, R. J.; Depres, L. THE OCEANIC MIGRATION OF AMERICAN SHAD, /ALOSA SAPIDISSIMA/, ALONG THE ATLANTIC COAST. NOAA Fish. Bull. 77 (1): 199-212. Jan. 1979. SFA 24(3)

[Va. Coop. Fish. Res. Unit, VPI&SU, Blacksburg 24061] The migratory route of American shad, /Alosa sapidissima/, in the Atlantic Ocean was studied using 14 yr of catch data collected during bottom trawl surveys by the U.S. National Marine Fisheries Service (and its predecessor) and cooperating foreign countries. All shad catches occurred at bottom temperatures from 3° to 15°C, with the most frequent catches between 7° and 13°C. Water temperatures between initial and peak entry of shad into home estuaries along the Atlantic coast are within the same thermal regime (3°-15°C). During the summer, all shad catches occurred north of lat. 40°N in two primary areas: Gulf of Maine and an area south of Nantucket Shoals. Previous studies on food habits and differences in time of capture during National Marine Fisheries Service surveys indicated that shad were vertical migrators, probably following the diel movements of large zooplankters in the water column. Shad were generally absent from the Gulf of Maine by late autumn, and concentrations were found between lat. 39° and 41°N during the winter. Based on previous tagging studies, National Marine Fisheries Service surveys, and coastal temperature data, most prespawning adults enter coastal waters along the Middle Atlantic Bight from lat. 36° to 40°N and then proceed north or south to natal rivers. Coastal surveys for river herring by North Carolina's anadromous fishery research program and commercial shad catches reported to the International Commission for the Northwest Atlantic Fisheries by member nations concur with our proposed bottom temperature (3°-15°C)-migratory route hypothesis for shad.

79-002087 Ramamohana Rao, G.; Kaliyamurthy, M. A NOTE ON THE ABUNDANCE AND DISTRIBUTION OF JUVENILES OF TWO PELONIFORM FISHES IN PULICAT LAKE. Indian J. Anim. Sci. 44 (10): 810-814. Oct. 1974. SFA 24(3)

79-002088 Stooksbury, S. STRIPERS: ON THE MOVE. Tenn. Wildl. 2 (5): 14-17. Mar.-Apr. 1979. SFA 24(3)
Movements of /Morone saxatilis/ in Tennessee reservoirs.--RS

79-002089 Tuberville, J. D. VERTICAL DISTRIBUTION OF ICHTHYOPLANKTON IN UPPER NICKAJACK RESERVOIR, TENNESSEE, WITH COMPARISON OF THREE SAMPLING METHODOLOGIES. IN R. C. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 185-203. 1979. SFA 24(3)
[Fish. Resour. Br., TVA, Norris, TN 37828] Vertical distribution of clupeid and drum, /Aplodinotus grunniens/ larvae in upper Nickajack Reservoir was determined using a highly stratified sampling regime. Clupeid larvae showed a preference for surface waters, especially during day. Most length groups of drum larvae were much more abundant at 3 to 6 m than at other depths during day, but more abundant in deeper waters at night. Results were compared to those obtained by Walker (1975) and TVA in 1977. Results were generally similar for clupeids, but the discrete-depth sampling conducted by Walker (1975) appeared to be less efficient in describing the distribution of drum larvae than stratified oblique sampling.

79-002090 Van Guelpen, L.; Davis, C. C. SEASONAL MOVEMENTS OF THE WINTER FLOUNDER, /PSEUDOPLEURONECTES AMERICANUS/, IN TWO CONTRASTING INSHORE LOCATIONS IN NEWFOUNDLAND. Trans. Am. Fish. Soc. 108 (1): 26-37. Jan. 1979. SFA 24(3)
[Huntsman Mar. Lab., St. Andrews, NB E0G 2X0, Canada]

79-002091 Vigg, S. VERTICAL DISTRIBUTION OF ADULT FISH IN PYRAMID LAKE, NEVADA. Great Basin Nat. 38 (4): 417-428. 31 Dec. 1978. SFA 24(3)
[W. F. Sigler & Assoc., Inc., 1005 Terminal Way, Suite 155, Reno, NV 89502] Inshore and limnetic vertical distribution of adult fish in Pyramid Lake, Nevada was determined from late spring to early fall 1977. The benthic (23 m) inshore area exhibited a relatively diverse composition of five species, while the inshore surface and offshore limnetic zones were composed of over 98 percent tui chubs (/Gila bicolor/). Vertical fish distribution was associated with temperature and zooplankton distribution.

FOODS AND FEEDING

79-002092 Albertova, C. POTRAVA PSTRUHA OBECNEHO A PSTRUHA DUHOVEHO VE VODARENSKE UDOLNI NADRZI HUBENOV. [THE FOOD OF BROWN AND RAINBOW TROUT IN THE WATER-SUPPLY RESERVOIR HUBENOV.] Vertebr. Zpravy 1978: 69-74. 1978. In Czech with English summ. SFA 24(3)
During the first years of existence of the water-supply reservoir Hubenov, investigations were carried out on the food eaten by brown trout (124 specimens) and rainbow trout (283 specimens). Zooplankton was the major component of the food eaten by the rainbow trout (72.6 percent), followed by benthos (19.7 percent) and terrestrial organisms (7.7 percent). In the food eaten by brown trout, the benthic component

79-002092 CONTINUED
(50.7 percent) predominated over plankton (36.4 percent) and the terrestrial component (13.0 percent). No fish were found in the diet of the trout during the first years as they did not occur in the reservoir in appreciable numbers. Small perch occurred in the diet of the rainbow trout only when they became more abundant in 1976.

79-002093 Bailey, K.; Dunn, J. SPRING AND SUMMER FOODS OF WALLEYE POLLOCK, /THERAGRA CHALCOGRAMMA/, IN THE EASTERN BERING SEA. NOAA Fish. Bull. 77 (1): 304-308. Jan. 1979. SFA 24(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

79-002094 Belman, B. W.; Anderson, M. E. AQUARIUM OBSERVATIONS ON FEEDING BY /MELANOSTIGMA PAMMELAS/ (PISCES: ZOARCIDAE). Copeia 1979 (2): 366-369. 18 May 1979. SFA 24(3)
[113 26th Street, Newport Beach, CA 92663]

79-002095 Bruton, M. N. THE FOOD AND FEEDING BEHAVIOUR OF /CLARIAS GARIEPINUS/ (PISCES: CLARIIDAE) IN LAKE SIBAYA, SOUTH AFRICA, WITH EMPHASIS ON ITS ROLE AS A PREDATOR OF CICHLIDS. Trans. Zool. Soc. Lond. 35 (1): 47-114. May 1979. SFA 24(3)
[J. L. B. Smith Inst. Ichthyol., Rhodes Univ., Grahamstown, South Africa]

79-002096 Bruton, M. N. THE ROLE OF DIEL INSHORE MOVEMENTS BY /CLARIAS GARIEPINUS/ (PISCES: CLARIIDAE) FOR THE CAPTURE OF FISH PREY. Trans. Zool. Soc. Lond. 35 (1): 115-138. May 1979. SFA 24(3)
[J. L. B. Smith Inst. Ichthyol., Rhodes Univ., Grahamstown, South Africa]

79-002097 Cheek, T. FOOD FOR THOUGHT. Tenn. Wildl. 2 (5): 18-21. Mar.-Apr. 1979. SFA 24(3)
Food habits of /Morone saxatilis/.--RS

79-002098 David, A.; Rajagopal, K. V. FOOD AND FEEDING RELATIONSHIPS OF SOME COMMERCIAL FISHES OF THE TUNGABHADRA RESERVOIR. Proc. Indian Natl. Sci. Acad. B 41 (1): 61-74. Feb. 1975. SFA 24(3)
/Puntius kolus/ with protrusible mouth is euryphagic in feeding, subsisting on molluscs, insects, ostracods, Bacillariophyceae and on grass seeds and decaying plant tissues. Correlation between feeding and food available in the environment was observed. It is adapted to the lacustrine environment though a river form. /Puntius pulchellus/ and /P. sarana/ are marginal submerged vegetative feeders subsisting on /Chara/, /Hydrilla/ and /Vallisneria/. During summer they feed on gastropods by necessity. Feeding habits are correlated with the available food items. /L. fimbriatus/ with ventrally placed mouth and fimbriated horny lips is highly adapted to bottom browsing. Its stenophagic feeding on sessile diatoms indicates its selectivity in feeding. Irrespective of lotic or lentic environments the fish feeds on similar food. /O. vigorsii/ is a column feeder preying upon smaller fish and insects. Though euryphagic in habits, it utilises /Spirogyra/, gastropods and incidently diatoms, plant matter, ostracods, copepods, etc. /C. catla/ is selective in feeding upon copepods, followed by diatoms and insects. /Tor/ spp. feed upon molluscs particularly gastropods followed by insects. There is a close relationship between the food ingested by the fish and items of food available in the reservoir. Many species take to alternate diet if their basic food is not available due to water level fluctuations and

79-002098 CONTINUED
turbidity.

79-002099 Dehadra, P. V.; Banerji, S. R. CAPACITY OF /ANABAS TESTUDINEUS/ (BLOCH) TO FEED ON INSECTS. J. Inland Fish. Soc. India 5: 137-140. Dec. 1973. SFA 24(3)

79-002100 Duka, L. A. TROPHIC COMPLEXES OF FISH LARVAE AND FINGERLINGS IN THE VEGETATIVE COASTAL ZONE OF THE BLACK SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 35-44. 1978. SFA 24(3)
[Inst. Biol. South. Seas, Ukrainian SSR Acad. Sci., Sevastopol, USSR]

79-002101 Forsythe, T. D. PREDATOR-PREY INTERACTIONS AMONG CRUSTACEAN PLANKTON, YOUNG BLUEGILL (/LEPOMIS MACROCHIRUS/), AND WALLEYE (/STIZOSTEDION VITREUM/) IN EXPERIMENTAL ECOSYSTEMS. Ph.D. dissertation, Mich. State Univ. 109p. 1978. From Diss. Abstr. Int. B Sci. Eng.39(10):4668. Apr. 1979. SFA 24(3)

79-002102 Frank, K. T. CONSEQUENCES OF THE DENSITY DEPENDENT BEHAVIOR OF A KEYSTONE SPECIES (/LEPOMIS CYANELLUS/ RAFINESQUE). Ph.D. dissertation, Univ. Toledo 95p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1609. Oct. 1978. SFA 24(3)
The effects of gradients of fish density on prey community structure and fish productivity were examined in a small, artificial pond in Lucas County, Ohio. Over a two-year period, densities of young-of-the-year green sunfish (/Lepomis cyanellus/ Rafinesque) were manipulated within experimental enclosures over a range of densities centered about their naturally occurring density within the pond. Analyses of the responses tested for the effects of fish predation on the zooplankton community in an effort to determine whether predation effects act in a fashion dependent or independent of predator density, and its consequences to the predator population. In general, the feeding behavior of the green sunfish had two consequences. First, prey community composition and standing crop were dependent upon predator density and, second, the productivity of the fish population was dependent upon the standing crop of prey. Furthermore, the intensity of predation acted both to enhance and depress the absolute levels of prey availability. The density of one larger prey species, /Cyclops/, decreased as fish density increased whereas the percentage of smaller prey species (e.g., copepod nauplii and the rotifer /Keratella/) increased with fish density. Prey availability per individual or the food ration was responsible for the growth rates of individual fish. Also, the availability per individual of certain larger prey species was identified as being significantly related to the growth rate of the fish. A general model was developed describing the mechanism by which fish populations adjust to food availability, accounting for the productivity of fish.

79-002103 Furnass, T. I. LABORATORY EXPERIMENTS ON PREY SELECTION BY PERCH FRY (/PERCA FLUVIATILIS/). Freshwater Biol. 9 (1): 33-43. Feb. 1979. SFA 24(3)
[Freshwater Biol. Assoc., The Ferry House, Ambleside, Cumbria LA22 OLP, England] In laboratory experiments, prey selection of zooplankters by starved perch fry (/Perca fluviatilis/) from Windermere, English Lake District, is temporally variable and there is usually, in the short-term, a persistent succession from one actively selected prey species to another. Provided that the prey is visible,

79-002103 CONTINUED
the patterns of prey selection are maintained irrespective of the accessibility of the prey. The fish do not optimize their energy intake per effort. The method of observing predation activity by fish shows qualitative and quantitative prey selection as time progresses in great detail.

79-002104 Gillen, A. L. FEEDING INTERRELATIONSHIPS BETWEEN THE SAND SHINER, /NOTROPIS STRAMINEUS/, AND THE STRIPED SHINER, /N. CHRYSOCEPHALUS/. Ohio J. Sci. 79: 94. Apr. 1979. Abstract only. SFA 24(3)
[Dep. Zool., Ohio State Univ., Columbus 43210] Feeding habits of /Notropis stramineus/ and /N. chrysocephalus/ were investigated in Buffalo Creek, Washington County, Pennsylvania during September through December, 1977. As an opportunistic feeder, /N. stramineus/ consumed large quantities of terrestrial (approximately 40 percent) and aquatic (approximately 50 percent) insects during September and October, but shifted almost entirely to benthic insects (approximately 90 percent), such as mayfly nymphs (/Caenis/ and /Stenonema/) and stonefly nymphs (/Allocperla/ and /Isoperla/), in November and December. /N. straminues/ utilized a wide range of prey with the bulk of its diet in the size class 5-8mm. /N. chrysocephalus/ was also an opportunistic feeder taking terrestrial and aquatic insects during fall. /N. chrysocephalus/ consumed large aquatic prey (9-12mm) including crayfish (/Orconectes/), large mayfly nymphs (/Stenonema/), and damselfly naiads (/Argia/) from September through November. However, in December its diet shifted to /Cladophora/ and a few aquatic Chironomidae larvae. Although diet overlap was nearly complete initially (September and October), it diminished as the season progressed. Food habits were unique to each species late in the year, suggesting that as food resources decline these two species appear to diverge in their food habits to minimize interspecific competition.

79-002105 Healey, M. C. DETRITUS AND JUVENILE SALMON PRODUCTION IN THE NANAIMO ESTUARY: I. PRODUCTION AND FEEDING RATES OF JUVENILE CHUM SALMON (/ONCORHYNCHUS KETA/). J. Fish. Res. Board Can. 36 (5): 488-496. May 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002106 Henwood, T.; Johnson, P.; Heard, R. FEEDING HABITS AND FOOD OF THE LONGSPINED PORGY, /STENOTOMUS CAPRINUS/ BEAN. Northeast Gulf Sci. 2 (2): 133-137. Dec. 1978. SFA 24(3)
[Box 386, Dauphin Island Sea Lab., Dauphin Island, AL 36528]

79-002107 Hullacher, L. E. PATTERNS OF SPACE AND FOOD USE BY INSHORE ROCKFISHES (SCORPAENIDAE: /SEBASTES/) OF CARMEL BAY, CALIFORNIA. Ph.D. dissertation, Univ. Calif. (Berkeley) 119p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):531. Aug. 1978. SFA 24(3)

79-002108 Hunter, J. R. BEHAVIOR AND SURVIVAL OF NORTHERN ANCHOVY /ENGRAULIS MORDAX/ LARVAE. Calif. Coop. Oceanic Fish Invest. Rep. 19: 138-146. Oct. 1977. SFA 24(3)
[NMFS, Southwest Fish. Cent., La Jolla, CA 92038] The object of this review was to provide an understanding of the behavioral factors that determine whether or not larvae of the northern anchovy, /Engraulis mordax/ Girard, will starve. The swimming and feeding behavior of anchovy larvae is described and related to temperature, developmental stage, characteristics of the food and food distribution and to other variables. The principal sources of this information were

79-002108 CONTINUED
published and unpublished observations of larvae cultured in the laboratory.

79-002109 Jackson, P. D. BENTHIC INVERTEBRATE FAUNA AND FEEDING RELATIONSHIPS OF BROWN TROUT, /SALMO TRUTTA/ LINNAEUS, AND RIVER BLACKFISH, /GADOPSIS MARMORATUS/ RICHARDSON, IN THE ABERFELDY RIVER, VICTORIA. Aust. J. Mar. Freshwater Res. 29 (6): 725-742. Dec. 1978. SFA 24(3)

[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., 123 Brown St., Heidelberg, Vic. 3084, Australia] The benthic invertebrate fauna and the stomachs of brown trout and river blackfish in a section of the Aberfeldy River, Victoria, were sampled regularly from October 1971 to November 1972. The ranges of food organisms utilized by the two species were very similar as were the proportions of the different food categories. Kendall rank correlation coefficients indicated that the diets of the two fishes were similar on all but the July sampling date. Due to apparent differences in habitat preferences this similarity in diets may be regarded as giving rise to indirect competition.

79-002110 Mackey, A. P. TROPHIC DEPENDENCIES OF SOME LARVAL CHIRONOMIDAE (DIPTERA) AND FISH SPECIES IN THE RIVER THAMES. Hydrobiologia 62 (3): 241-247. 12 Feb. 1979. SFA 24(3)

[Freshwater Biol. Assoc., River Lab., East Stoke, Dorset BH20 688, England] An investigation into the trophic dependencies of fish and chironomids in the River Thames, U.K., is described. The food of 15 species of larval chironomid was studied and the importance of chironomids as food for five species of fish was assessed. Very fine detritus, probably tripton, was the sole food item of planktonic first instar larvae. Fine detritus was the most important food item in the diets of most larval chironomid species and was even a major food item of the predacious Tanypodinae. Diatoms were the next most important food item; filamentous green algae, coarse detritus and animal remains, although present in the gut, were not important numerically. It was concluded that three species were filter feeders, whilst the other species were non-selective detritivores. Chironomids were important in the diets of all fish species studied; peak numbers were ingested in June. During the winter, fish ingested chironomids from the /acorus/ and flint zones. In the spring and summer, when large populations of chironomids were available in the /Nuphar/ zone, the fish utilized these. This study underlines the importance of detritus in the river system, from the tripton to the fish via the chironomids.

79-002111 Mancini, E. R.; Busdosh, M.; Steele, E. D. UTILIZATION OF AUTOCHTHONOUS MACROINVERTEBRATE DRIFT BY A POOL FISH COMMUNITY IN A WOODLAND STREAM. Hydrobiologia 62 (3): 249-256. 12 Feb. 1979. SFA 24(3)

[Woodward-Clyde Consultants, 3489 Kurtz Street, San Diego, CA 92110] Qualitative and quantitative drift data were collected simultaneously above and below a pool both before and after the pool was heavily electrofished. These data revealed no significant difference between drift organism densities (no./m^3) above or below the pool before or after fish collection. Qualitative and quantitative fish gut analyses suggest that the sunfishes /Lepomis megalotis/, /L. macrochirus/ and /L. cyanellus/ may be feeding on drifting invertebrates as these organisms comprised 58 percent, 37 percent and 35 percent gut volume, respectively. A design for a long-term drift net apparatus is presented.

79-002112 Matthey, J. K.; Reynolds, W. W. FOOD HABITS OF SQUIRRELFISH, /ADIORYX SUBORBITALIS/, IN THE GULF OF CALIFORNIA. Calif. Fish Game 65 (1): 62-64. Jan. 1979. SFA 24(3)
[Dep. Biol., Pa. State Univ., P.O. Box 1830, Wilkes-Barre 18708]

79-002113 McKaye, K. R.; Weiland, D. J.; Lin, T. M. THE EFFECT OF LUMINANCE UPON THE DISTRIBUTION AND BEHAVIOR OF THE ELECTRID FISH /GOBIOMORUS DORMITOR/, AND ITS PREY. Rev. Can. Biol. 38 (1): 27-36. Mar. 1979. SFA 24(3)
[Dep. Biol., Yale Univ., New Haven, CT 06520]

79-002114 Montgomery, W. L. MECHANISMS OF HERBIVORY IN DAMSELFISHES (POMACENTRIDAE) FROM THE GULF OF CALIFORNIA, MEXICO. Ph.D. dissertation, Ariz. State Univ. 101p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5276. May 1979. SFA 24(3)

79-002115 Natarajan, A. V.; Ramakrishnaiah, M.; Khan, M. A. THE FOOD SPECTRUM OF TRASH FISHES IN RELATION TO MAJOR CARPS IN KONAR AND TILAIYA RESERVOIRS (BIHAR). J. Inland Fish. Soc. India 7: 65-75. Dec. 1975. SFA 24(3)

79-002116 Overholtz, W. J.; Nicolas, J. R. APPARENT FEEDING BY THE FIN WHALE, /BALAENOPTERA PHYSALUS/, AND HUMPBACK WHALE, /MEGAPTERA NOVAENGLIAE/, ON THE AMERICAN SAND LANCE, /AMMODYTES AMERICANUS/, IN THE NORTHWEST ATLANTIC. NOAA Fish. Bull. 77 (1): 285-287. Jan. 1979. SFA 24(3)
[NMFS, Woods Hole Lab., Woods Hole, MA 02543]

79-002117 Paloheimo, J. E. INDICES OF FOOD TYPE PREFERENCE BY A PREDATOR. J. Fish. Res. Board Can. 36 (4): 470-473. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Zool., Univ. Toronto, Toronto, ON M5S 1A1, Canada]

79-002118 Ringler, N. H. SELECTIVE PREDATION BY DRIFT-FEEDING BROWN TROUT (/SALMO TRUTTA/). J. Fish. Res. Board Can. 36 (4): 392-403. Apr. 1979. In English with French summ. SFA 24(3)
[Sch. Biol. Chem. Ecol., S.U.N.Y. Coll. Environ. Sci. For., Syracuse, NY 13210]

79-002119 Shah, K. L. STUDIES ON THE FOOD AND FEEDING HABITS OF BROWN TROUT /SALMO TRUTTA/ L. IN RIVER BEAS. J. Inland Fish. Soc. India 7: 101-104. Dec. 1975. SFA 24(3)

79-002120 Sheridan, P. F. FOOD HABITS OF THE BAY ANCHOVY, /ANCHOA MITCHILLI/, IN APALACHICOLA BAY, FLORIDA. Northeast Gulf Sci. 2 (2): 126-132. Dec. 1978. SFA 24(3)
[U.S. EPA, Bears Bluff Field Stn., P.O. Box 368, Johns Island, SC 29455] Ontogenetic, spatial and temporal aspects of the food habits of the bay anchovy, /Anchoa mitchilli/, were examined in fish collected from apalachicola Bay, Florida. Calanoid copepods were the major constituent of the anchovy diet, but their importance declined with fish growth as larger zooplankters such as mysids were consumed. Specialization upon copepods led to moderate diet similarity among sites in the estuary, except in areas near the mouth of the Apalachicola River where mysids, insect larvae, and cladocerans were

79-002120 CONTINUED
major food items. Copepods were the dominant prey in all months but were markedly less abundant prey in October, December, and February when other crustaceans and insect larvae became relatively more abundant.

79-002121 Sibert, J. R. DETRITUS AND JUVENILE SALMON PRODUCTION IN THE NANAIMO ESTUARY: II. MEIOFAUNA AVAILABLE AS FOOD TO JUVENILE CHUM SALMON (/ONCORHYNCHUS KETA/). J. Fish. Res. Board Can. 36 (5): 497-503. May 1979. In English with French summ. SFA 24(3)
[Dep. Fish. Oceans, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002122 Spoustova, J. POTRAVA NEKTERYCH DRUHU RYB VE VODARENSKYCH NADRZICH HUBENOV A ZELIVKA. [THE FOOD EATEN BY CERTAIN FISH SPECIES IN THE WATER-SUPPLY RESERVOIRS HUBENOV AND ZELIVKA.] Vertebr. Zpravy 1978: 80-83. 1978. In Czech with English summ. SFA 24(3)
Of the fish species examined (perch, roach, carp, bream, chub), zooplankton (cladocerans) was the dominant component in the diet of the first three. Hence, the occurrence of perch, roach and carp bream in water-supply reservoirs is undesirable.

79-002123 Stauffer, T. M.; Wagner, W. C. FISH PREDATION ON LAKE TROUT EGGS AND FRY IN THE GREAT LAKES, 1973-1978. Mich. Dep. Nat. Resour. Fish. Res. Rep. no. 1864. 13p. 22 Feb. 1979. SFA 24(3)
[Mich. Dep. Nat. Resour., East Lansing] During lake trout spawning predation on eggs was very light. Round whitefish (745) and burbot (20) contained 1 and 29 lake trout eggs per fish, respectively, but there was less than 0.1 egg per stomach in lake trout (821), longnose suckers (456), lake chubs (103), white suckers (37), and lake whitefish (24). The apparent scarcity of fish other than lake trout in multisized mesh gill nets at spawning time also suggested that predation was light. Sculpins ate a few eggs in the 1- to 3-week period after lake trout spawning. In contrast to predation on naturally deposited eggs, predation on artificially deposited eggs was severe, at least during the 24-hour period after deposition. In these collections lake trout (8) contained 515 eggs per fish, round whitefish (41) 44, and longnose suckers (9) 16. Alewives (49) did not contain eggs. Predation on fry was practically nil while they were in a spawning reef and while they migrated away from the reef during May-July. Although burbot (97) contained 0.2 fry per stomach, the number of fry per stomach was less than 0.02 for mottled sculpins (796), slimy sculpins (669), yellow perch (188), round whitefish (110), trout-perch (106), coho salmon (65), and rainbow smelt (49).

79-002124 Tricas, T. C. RELATIONSHIPS OF THE BLUE SHARK, /PRIONACE GLAUCA/, AND ITS PREY SPECIES NEAR SANTA CATALINA ISLAND, CALIFORNIA. NOAA Fish. Bull. 77 (1): 175-182. Jan. 1979. SFA 24(3)
[Dep. Zool., Univ. Hawaii at Manoa, Honolulu 96822] Small fishes and cephalopods associated with both pelagic and inshore habitats composed the major prey for the blue shark, /Prionace glauca/, near Santa Catalina Island, Calif. The northern anchovy, /Engraulis mordax/, was the predominant prey for sharks in the immediate study area while at least 13 species of pelagic cephalopods constituted major prey for sharks in more distant oceanic waters. Inshore species taken by sharks included pipefish, /Syngnathus californiensis/; jack mackerel, /Trachurus symmetricus/; and blacksmith, /Chromis punctipinnis/. In addition, sharks moved inshore to feed or winter spawning schools of market squid, /Loligo opalescens/. Digestive rate studies and telemetric monitoring of activity patterns indicate that sharks forage in waters near the surface from around midnight through

79-002124 CONTINUED
dawn. Diel activities of prey species were examined and show that most prey dispersed in the upper water column at night and refuged during the day either by schooling (anchovies and jack mackerel) or by retreating to deeper waters (pelagic cephalopods). Field observations of shark feeding behavior indicate that predatory modes vary in response to prey behavior.

79-002125 Varley, J. D. THE INFLUENCE OF RAINBOW TROUT GRAZING ON ZOOPLANKTON IN FLAMING GORGE RESERVOIR. Utah State Div. Wildl. Resour. Publ. No. 75-5. 11p. 1979. Available from Utah State Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116. SFA 24(3)
Zooplankton sampling and rainbow trout stomach data collected over a five-year period from Flaming Gorge Reservoir indicated that trout grazed significantly on zooplankton and thereby caused important modifications in the plankton community. Data are presented which indicate that trout negatively influence the abundance and size of copepods and cladocerans and the species composition. The impact of these phenomena on sport fishery is discussed.

79-002126 Virnstein, R. W. PREDATION ON ESTUARINE INFAUNA: RESPONSE PATTERNS OF COMPONENT SPECIES. Estuaries 2 (2): 69-86. June 1979. SFA 24(3)
[Harbor Br. Found., RFD 1, Box 196, Fort Pierce, FL 33450]

79-002127 von Ende, C. N. FISH PREDATION, INTERSPECIFIC PREDATION, AND THE DISTRIBUTION OF TWO /CHAOBORUS/ SPECIES. Ecology 60 (1): 119-128. Feb. 1979. SFA 24(3)
[Dep. Biol. Sci., North. Ill. Univ., DeKalb 60115] In sampling 22 lakes in the Upper Peninsula of Michigan, I found that 2 species of /Chaoborus/, /C. punctipennis/ and /C. americanus/, never co-occurred. /Chaoborus punctipennis/ was found only in lakes with fish whereas /C. americanus/ occurred alone in stained, bog lakes without fish. Third and 4th instar /C. americanus/ lack extensive diel, vertical migratory behavior and are found near the surface waters in stained bog lakes. Adults of this species emerge in the middle of May. Third and 4th instar /C. punctipennis/ exhibit diel, vertical migration. They are benthic during the day. This species emerges at the end of June. /In situ/ rearing experiments indicate that /Chaoborus americanus/ larvae can survive in lakes with fish, when isolated from the fish. Fish (/Umbra limi/) added to a lake with /C. americanus/ eliminated this /Chaoborus/ species from the lake. It is concluded that the absence of /C. americanus/ from lakes with /C. punctipennis/ is due to fish predation on the older larvae of /C. americanus/. /Chaoborus punctipennis/ adults are able to disperse to lakes from which their larvae are absent. /In situ/ experiments indicate /C. punctipennis/ can survive on the zooplankton in a stained, fishless bog lake, but is subject to heavy predation by 3rd and 4th instar /C. americanus/ larvae. It is concluded that because of early recruitment by /C. americanus/, as well as its lack of extensive vertical migration, this species excludes /C. punctipennis/ from stained, fishless bog lakes.

79-002128 Vostradovska, M. K POTRAVNI BIOLOGII STIKY CERCNE VE VODARENSKYCH NADRZICH ZELIVKA A HUBENOV. [ON THE TROPHIC BIOLOGY OF PIKE IN THE WATER-SUPPLY RESERVOIRS ZELIVKA AND HUBENOV.] Vertebr. Zpravy 1978: 74-80. 1978. In Czech with English summ. SFA 24(3)
A report is given on the results of studies of the composition of food eaten by pike in two water-supply reservoirs, Hubenov and Zelivka. In the Hubenov one, the diet of the pike consisted of perch that accounted for 65 to 68 percent of the contents of their alimentary tracts; from 615 mm of body length onwards, the pike also consumed rainbow trout. Under shortage of fish food, pike up to 500 mm of total body length also consumed caddis worms and other insects. In the Zelivka reservoir, with different fish population, the pike mainly preyed on roach and perch of the 23 fish species occurring in the reservoir. After the filling of the reservoir, the percentage of roach in the diet of the pike showed a gradual increase; that of the perch decreased. Compared with the perchpike, the pike consumes a wider range of prey species. In both water-supply reservoirs, the pike can be considered an important predator showing a strong biomelioration effect on plankton-feeding fish species among which roach and perch predominate.

79-002129 Wankowski, J. W. J.; Thorpe, J. E. SPATIAL DISTRIBUTION AND FEEDING IN ATLANTIC SALMON, /SALMO SALAR/ L. JUVENILES. J. Fish Biol. 14 (3): 239-247. Mar. 1979. SFA 24(3)
[J. E. Thorpe: Dep. Agric. Fish. Scotland, Freshwater Fish. Lab., Faskally, Pitlochry, Perthshire, Scotland] The distribution, social behaviour, and feeding behaviour of juvenile Atlantic salmon were studied in a selection of stream and river habitats in northern Scotland using Scuba diving techniques. The results are discussed with respect to food acquisition and choice of feeding site. It is concluded that juvenile salmon feed predominantly on drifting material and that their daytime distribution reflects the current velocity related abundance of drift.

79-002130 Whitfield, A. K.; Blaber, S. J. M. PREDATION ON STRIPED MULLET (/MUGIL CEPHALUS/) BY /CROCODYLUS NILOTICUS/ AT ST. LUCIA, SOUTH AFRICA. Copeia 1979 (2): 266-269. 18 May 1979. SFA 24(3)
[IFWS Swartvlei Prog., P.O. Box 49, Sedgefield, 6573 South Africa]

AGE AND GROWTH

79-002131 Beamish, R. J. DIFFERENCES IN THE AGE OF PACIFIC HAKE /MERLUCCIUS PRODUCTUS/) USING WHOLE OTOLITHS AND SECTIONS OF OTOLITHS. J. Fish. Res. Board Can. 36 (2): 141-151. Feb. 1979. In English with French summ. SFA 24(3)
[Dep. Fish Ocean, Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002132 Campbell, J. S.; Babaluk, J. A. AGE DETERMINATION OF WALLEYE, /STIZOSTEDION VITREUM VITREUM/ (MITCHILL), BASED ON THE EXAMINATION OF EIGHT DIFFERENT STRUCTURES. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 849. iv + 23p. Apr. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Winnipeg, MB R3T 2N6, Canada] Prior to the initiation of a study to identify and quantify the factors which control the biology and productive capacity of walleye, /Stizostedion vitreum vitreum/ (Mitchill), in Wapun Lake, a small boreal lake situated in northern Manitoba, reliable methods of age determination

79-002132 CONTINUED
had to be established. Difficulties had been experienced in using scales to determine ages of older walleye taken from unexploited populations. Scales as well as calcified structures, namely dorsal fin spines, vertebrae, pelvic and pectoral fin rays, opercles, branchiostegal rays and otoliths were collected from 103 specimens. Analysis of age determinations from the various structures indicated that scales consistently underestimated ages of walleye older than eight years. Annuli were more easily distinguished on opercles and in sections of dorsal fin spines, otoliths, branchiostegal rays and vertebrae. Although other bony structures may be more reliable, dorsal fin spines are the most practical because they are easier to collect, and removal of the second spine in the dorsal fin allows the fish to be released alive. We suggest that if scales must be used for aging purposes in an unexploited or slow-growing walleye population, they should only be employed after sufficient confidence in aging has been obtained by relating scale age determinations to those ages determined from corresponding bony structures.

79-002133 Gallucci, V. F.; Quinn, T. J. II REPARAMETERIZING, FITTING, AND TESTING A SIMPLE GROWTH MODEL. Trans. Am. Fish. Soc. 108 (1): 14-25. Jan. 1979. SFA 24(3)
[Cent. Quant. Sci. For. Fish. Wildl., Univ. Wash., Seattle 98195]

79-002134 Ghosh, K. K. ON THE CHOICE OF A GROWTH CURVE FOR INDIAN MAJOR CARPS--VON BERTALANFFY OR GOMPERTZ? J. Indian Soc. Agric. Stat. 26 (2): 57-70. Dec. 1974. SFA 24(3)
von Bertalanffy's growth curve has been compared to Gompertz growth curve as capable of describing fish growth. Both curves have been shown to be derivable from basic equation of growth. Gompertz curve is shown to be free from some restrictive conditions necessary for the validity of von Bertalanffy's curve. Criteria for choosing the closer fitting curve have been given. The growth data of Indian major carps, /Catla catla/ of R. Yamuna, /Cirrhinus mrigala/ of R. Yamuna and R. Godavari and /Labeo calbasu/ of R. Yamuna have been analysed for finding the more suitable curve. The superiority of Gompertz in all cases has been established. A simplified yield equation when Gompertz growth model is valid has also been developed involving the use of incomplete gamma function.

79-002135 Gupta, S. D.; Jhingran, A. G. AGEING /LABEO CALBASU/ (HAMILTON) THROUGH ITS SCALES. J. Inland Fish. Soc. India 5: 126-128. Dec. 1973. SFA 24(3)

79-002136 Ivanova, Z. A. GROWTH VARIABILITY IN THE CARP, /CYPRINUS CARPIO/ IN SIBERIAN WATERS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 45-55. 1978. SFA 24(3)
[SibNIIPTIZh, Novosibirsk, USSR] Variability of the weight and length of underyearlings of carp, /Cyprinus carpio/, was examined in relation to food supply and its qualitative composition. At high stocking densities and when feeding with mixed feed with a predominance of ingredients of vegetable origin, the presence in ponds of local groups forming micropopulations differing substantially in rate of growth, was noted. The existence of a direct correlation between the weight of underyearlings and the amount of body fat (r = 0.79) makes it possible to use the curve of variability of growth of underyearlings when estimating the physiological preparedness of a fish population for overwintering. The coefficient of variation and the curve of weight distribution may be used to decide the direction to take and how rigorously to select in carp breeding. The time for

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the filling of rearing ponds, and in this connection the provision of carp underyearlings with natural food during the initial period of their postembryonic development substantially influence their rate of growth in the later stages of development.

79-002137 Karamchandani, S. J.; Mishra, D. N. OBSERVATIONS ON THE GROWTH RATE OF /CATLA CATLA/ (HAMILTON) BASED ON THE RECOVERY OF ONE TAGGED SPECIMEN FROM KULGARHI RESERVOIR, MADHYA PRADESH. J. Inland Fish. Soc. India 6. Dec. 1974. SFA 24(3)

79-002138 Kimura, D. K.; Mandapat, R. R.; Oxford, S. I. METHOD, VALIDITY, AND VARIABILITY IN THE AGE DETERMINATION OF YELLOWTAIL ROCKFISH (/SEBASTES FLAVIDUS/), USING OTOLITHS. J. Fish. Res. Board Can. 36 (4): 377-383. Apr. 1979. In English with French summ. SFA 24(3)
[Wash. Dep. Fish., Olympia 98504]

79-002139 Krishnayya, C. G. ON THE USE OF OTOLITHS IN THE DETERMINATION OF AGE AND GROWTH OF THE GANGETIC WHITING, /SILLAGO PANIJUS/ (HAM. BUCH.), WITH NOTES ON ITS FISHERY IN HOOGHLY ESTUARY. Indian J. Fish. 10 (2a): 391-412. 1963. SFA 24(3)

79-002140 Leontovyc, I.; Vostradovsky, J. RUST PSTRUHA OBECNEHO A PSTRUHA DUHOVEHO V PRVNICH SESTI LETECH EXISTENCE VODARENSKE UDOLNI NADRZE HUBENOV. [GROWTH OF BROWN AND RAINBOW TROUT DURING THE FIRST SIX YEARS OF EXISTENCE OF THE WATER-SUPPLY RESERVOIR HUBENOV.] Vertebr. Zpravy 1978: 65-69. 1978. In Czech with English summ. SFA 24(3)

79-002141 Libosvarsky, J. VYPOCET A UPLATNENI RUSTOVE ROVNICE BERTALANFFYHO V EKOLOGICKEM VYZKUMU. [COMPUTATION AND USE OF BERTALANFFY'S GROWTH EQUATION IN ECOLOGICAL RESEARCH.] Vertebr. Zpravy 1978: 89-92. 1978. In Czech with English summ. SFA 24(3)

79-002142 Mense, J. B. GROWTH AND LENGTH-WEIGHT RELATIONSHIPS OF TWENTY-ONE RESERVOIR FISHES IN OKLAHOMA. Okla. Fish. Res. Lab. Bull. no. 13. 155p. Sept. 1976. SFA 24(3)
[Okla. Fish. Res. Lab., Norman]

79-002143 Ottaway, E. M.; Simkiss, K. A COMPARISON OF TRADITIONAL AND NOVEL WAYS OF ESTIMATING GROWTH RATES FROM SCALES OF NATURAL POPULATIONS OF YOUNG BASS (/DICENTRARCHUS LABRAX/). J. Mar. Biol. Assoc. U.K. 59 (1): 49-59. Feb. 1979. SFA 24(3)
[Teesdale Unit, Freshwater Biol. Assoc., Lartington, Barnard Castle, Co. Durham, U.K.] Traditional scale reading methods have been compared with [^{14}C]glycine uptake data to study scale growth in bass. Both methods are capable of being used to age young fish and determine their rate of growth. The glycine incorporation rate is, however, of more value in studying short term changes in fish growth. When applied in this way, it indicates that the apparent isometric relationship between scale and body length is actually the sum of a number of allometric interactions. Some of the errors that can occur in scale reading are demonstrated by the application of these methods.

79-002144 Phillips, A. C.; Barraclough, W. E. EARLY MARINE GROWTH OF JUVENILE PACIFIC SALMON IN THE STRAIT OF GEORGIA AND SAANICH INLET, BRITISH COLUMBIA. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 830. iv + 19p. Oct. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] The early marine growth of pacific salmon (/Oncorhynchus sp./) in the southern Strait of Georgia and Saanich Inlet was examined through samples taken by two-boat surface trawl from April to July, 1966-1969, 1973, and 1975. Growth rates calculated from change in average size with time showed pink salmon to grow at rates of 3.5-4 percent body weight per day and chum salmon to grow at rates of 4-5 percent per day over the weight range 0.5-10 g. Rates could not be calculated on this basis for sockeye, chinook, or coho as their size distributions were influenced by other factors besides growth. Some juvenile salmon use Saanich Inlet from June to mid-July as an intermediate nursery area between nearshore waters and the open ocean. Fish appeared to leave Saanich Inlet as their fork length approached 100 mm.

79-002145 Tanaka, S.; Mizue, K. STUDIES IN SHARKS--XV. AGE AND GROWTH OF JAPANESE DOGFISH /MUSTELUS MANAZO/ BLEEKER IN THE EAST CHINA SEA. Bull. Jpn. Soc. Sci. Fish. 45 (1): 43-50. Jan. 1979. SFA 24(3)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan] Vertebral centrums of Japanese dogfish /Mustelus manazo/ which were caught in the East China Sea between July 1975 and February 1977 and collected at Nagasaki Fishmarket were used as the materials for age-determination and growth studies. One ring is formed once a year in both sexes from March to June. Von Bertalanffy growth equation of this species was obtained by Allen's method is: $L(t)=71.4[1-\exp(-0.695(t+0.734))]$ for males $I(t)=88.6[1-\exp(-0.379(t+1.133))]$ for females where L(t) is the total length in cm at age t and t is age in years. Estimating from growth curves, the sexual maturity of this species is at the age of two or three years in males as well as in females. The relationship between the total length I(cm) and the body weight W (g) is: $W=6.41\times10^{-3}L^{2.8524}$ for males and $W=9.98\times10^{-4}L^{3.3093}$ for females.

79-002146 Thakur, N. K.; Das, N. K. LENGTH-WEIGHT RELATIONSHIP OF /HETEROPNEUSTES FOSSILIS/ (BLOCH). J. Inland Fish. Soc. India 6: 95-96. Dec. 1974. SFA 24(3)

79-002147 Varghese, T. J. ESTIMATION OF THE AGE AND GROWTH OF /COILIA RAMCARATI/ GUNTHER. J. Inland Fish. Soc. India 5: 115-125. Dec. 1973. SFA 24(3)

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC.

79-002148 Bannerot, S. P. FISH DENSITY AS A FUNCTION OF REEF SIZE. Fla. Sci. 42 (Suppl. 1): 22. 1979. Abstract only. SFA 24(3)
[Dep. Biol., Univ. Miami, Coral Gables, FL 33124] A random visual technique is used to assess diurnal density of coral reef fishes on a series of five isolated patch reefs off Newfound Harbor Keys, Monroe County, Florida. Species are divided according to diel activity pattern and the densities of the two groups are compared to reef size. Diurnally inactive species density showed a significant inverse relation to reef size, while diurnally active species density showed a direct relation to reef size. Greater diversity and abundance of microhabitats on larger reefs may cause higher diurnally active fish

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density. It is suggested that diurnally inactive fish density is related to the ratio of reef area to nearby foraging area, which is lower on smaller reefs. Within reef density variation is higher for diurnally inactive species due to the patchy distribution of large resting schools.

79-002149 Barger, L. E.; Collins, L. A.; Finucane, J. E. FIRST RECORD OF BLUEFISH LARVAE, /POMATOMUS SALTATRIX/, IN THE GULF OF MEXICO. Northeast Gulf Sci. 2 (2): 145-148. Dec. 1978. SFA 24(3)
[NMFS, 3500 Delwood Beach Rd., Panama City, FL 32407]

79-002150 Barnes, M. D. EASTERN SAND DARTER, /AMMOCRYPTA PELLUCIDA/ AND OTHER FISHES FROM THE STREAMS OF THE WAYNE NATIONAL FOREST. Ohio J. Sci. 79 (2): 92-94. Mar. 1979. SFA 24(3)
[Cent. Lake Erie Area Res., Ohio State Univ., Columbus 43210]

79-002151 Basu, N. C.; Pakrasi, B. B. ON THE OCCURRENCE OF MILK FISH, /CHANOS CHANOS/ (FORSKAL) LARVAE IN THE BAKKHALI REGION OF LOWER SUNDERBANS. J. Inland Fish. Soc. India 8: 97-104. Dec. 1976. SFA 24(3)

79-002152 Bhatnagar, G. K. ON A COLLECTION OF FISH FROM BHAKRA RESERVOIR, SUTLEJ RIVER AND CLOSELY ASSOCIATED WATERS. J. Inland Fish. Soc. India 5: 134-136. Dec. 1973. SFA 24(3)

79-002153 Bird, F. H.; Roberson, K. PYGMY WHITEFISH, /PROSOPIUM COULTERI/, IN THREE LAKES OF THE COPPER RIVER SYSTEM IN ALASKA. J. Fish. Res. Board Can. 36 (4): 468-470. Apr. 1979. In English with French summ. SFA 24(3)
[Alaska Dep. Fish Game, Commer. Fish. Div., Glennallen 99588]

79-002154 Bohnsack, J. A. AN EXPERIMENTAL COMPARISON OF REEF FISH COMMUNITY STRUCTURE ON FLORIDA AND AUSTRALIAN MODEL REEFS. Fla. Sci. 42 (Suppl. 1): 22. 1979. Abstract only. SFA 24(3)
[Dep. Biol., Univ. Miami, Coral Gables, FL 33124] Six model reefs were monitored in Florida over a period of 41 months. Census results were compared to published results from eight similar reefs constructed at similar latitude on One Tree Island Reef, Australia. Similar values found for Florida (F) and Australian (A) reefs were: total number of observed species (89 F vs. 85 A), total number of families (31 F vs. 31 A), species per residency category (55 F vs. 58 A residents, 26 F vs. 22 A visitors, 8 F vs. 5 A transients), and mean number of individuals per monthly census (mean = 65.0, s^2 = 824 F vs. mean = 86.7, s^2 = 2000 A). Despite a 50 percent larger Australian species pool (517 vs. 800), Florida reefs had significantly more species per monthly census (mean = 17.1, s^2 = 12.4 vs. mean = 12.8, s^2 = 4.5) (p 0.01). Environmental disturbance, via more extreme water temperatures in Florida, may allow greater species packing in Florida, consistant with the intermediate disturbance hypothesis.

79-002155 Bourgeois, M. FISHES OF THE SIOUX FALLS RIVER PARK AREA. Proc. N.D. Acad. Sci. 33: 83. Apr. 1979. Abstract only. SFA 24(3)
[Dep. Nat. Resour., Sioux Falls Coll., Sioux Falls, SD 57101]

79-002156 Chandra, R. ON THE OCCURRENCE OF /PSILORHYNCHUS SUCATIO/ (HAM.) IN THE RIVER GANGA AT ALLAHABAD AND FURTHER WITH NOTES ON THE DISTRIBUTION OF /PSILORHYNCHUS/ SPP. Matsya 2: 81-82. 1976. SFA 24(3)
[Cent. Inland Fish. Res. Inst., Natun Sarania, Gauhati-781 003, Assam, India]

79-002157 Colton, D. E.; Alevizon, W. S. A DESCRIPTION OF THE FISH ASSEMBLAGE ASSOCIATED WITH A CALCIUM CARBONATE REEF OFF THE FLORIDA KEYS. Fla. Sci. 42 (Suppl. 1): 22. 1979. Abstract only. SFA 24(3)
[Fla. Inst. Technol., Melbourne 32901]

79-002158 Crossman, E. J.; Leach, J. H. FIRST CANADIAN RECORD OF A FLATHEAD CATFISH. Can. Field-Nat. 93 (2): 179-180. Apr.-June 1979. SFA 24(3)
[Dep. Ichthyol. Herpetol., R. Ont. Mus., Toronto, ON M5S 2C6, Canada] /Pylodictis olivaris/ was captured in the Canadian waters of Lake Erie on 22 August 1978. This is a 30-km range extension north and is the first Canadian record.

79-002159 Dalen, J.; Smedstad, O. M. BUNNFISKUNDERSOKELSER VED BJORNOYA OG VEST-SPITSBERGEN HOSTEN 1977. [INVESTIGATIONS ON DEMERSAL FISH AT BEAR ISLAND AND WEST-SPITSBERGEN IN AUTUMN 1977.] Fisken Havet 1978 (3): 1-14. 1978. In Norwegian with English summ. SFA 24(3)
[Fiskeridir. Havforskningsinst., Bergen, Norway]

79-002160 Dodrill, J. W.; Gilmore, R. G. FIRST NORTH AMERICAN CONTINENTAL RECORD OF THE LONGFIN MAKO (/ISURUS PAUCUS/ GUITART MANDAY). Fla. Sci. 42 (1): 52-58. 1979. SFA 24(3)
[Inst. Mar. Sci., Univ. N.C., Morehead City 28557]

79-002161 Gilbert, C. R. , (ed.) RARE AND ENDANGERED BIOTA OF FLORIDA. VOLUME FOUR. FISHES. Fla. Game Fresh Water Fish Comm. xviii + 58p. 1978. SFA 24(3)

79-002162 Goto, A.; Nakanishi, T.; Utoh, H.; Hamada, K. [A PRELIMINARY STUDY OF THE FRESHWATER FISH FAUNA OF RIVERS IN SOUTHERN HOKKAIDO.] Bull. Fac. Fish. Hokkaido Univ. 29 (2): 118-130. June 1978. In Japanese with English summ. SFA 24(3)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-002163 Hastings, P. A. FIRST NORTH AMERICAN CONTINENTAL RECORDS OF /GOBIONELLUS PSEUDOFASCIATUS/ (PISCES: GOBIIDAE). Northeast Gulf Sci. 2 (2): 140-144. Dec. 1978. SFA 24(3)
[Harbor Branch Found., Inc., RR 1, Box 196, Fort Pierce, FL 33450]

79-002164 Hocutt, C. H. DRAINAGE EVOLUTION AND FISH DISPERSAL IN THE CENTRAL APPALACHIANS: SUMMARY. Bull. Geol. Soc. Am. 90 (1): 129-130. Feb. 1979. SFA 24(3)
[Frostburg State Coll., Gunter Hall, Frostburg, MD 21532]

79-002165 Hocutt, C. H.; Denoncourt, R. F.; Stauffer, J. R., Jr. FISHES OF THE GAULEY RIVER, WEST VIRGINIA. Brimleyana no. 1. p. 47-80. Mar. 1979. SFA 24(3)
[Appalachian Environ. Lab., Univ. Md., Frostburg 21532] The confluence of Gauley River and New River forms the Kanawha River a short distance above Kanawha Falls, West Virginia. A survey of fishes of Gauley River in 1976 yielded 50 species, 25 of which were not previously reported in the literature. Six species (/Lampetra aepyptera/, /Moxostoma erythrurum/, /Ictalurus natalis/, /Ictalurus nebulosus/, /Noturus flavus/, and /Percina caprodes/) established new distribution records above Kanawha Falls, which is generally recognized as a major barrier to fish dispersal. Additional verified records increased the total known ichthyofauna to 58 species. These data suggest that fishes which successfully negotiated Kanawha Falls may have found the Gauley River a less strenuous route than the New River for upstream dispersal. Gauley River fauna also may have been influenced by stream captures with Greenbrier and Elk rivers.

79-002166 Hoke, R. A.; Norrocky, M. J.; Prater, E. I. FISH SURVEY IN THE LOWER PORTAGE RIVER, OHIO, 1975. Ohio J. Sci. 79 (2): 95-96. Mar. 1979. SFA 24(3)
[Dep. Biol. Sci., Bowling Green State Univ., Bowling Green, OH 43403]

79-002167 Joseph, T. W. AN INDEXED ANNOTATED BIBLIOGRAPHY OF THE RARE FISHES OF THE UPPER MISSOURI RIVER SYSTEM. U.S. Fish Wildl. Serv. FWS/OBS-78/13. 288p. Oct. 1977. SFA 24(3)
[Ecology Consultants, Inc., 1716 Heath Parkway, Fort Collins, CO 80521]

79-002168 Jyrkkanen, J.; Wright, D. G. FIRST RECORD OF THE NORTHERN BROOK LAMPREY, /ICHTHYOMYZON FOSSOR/, IN THE NELSON RIVER DRAINAGE, MANITOBA. Can. Field-Nat. 93 (2): 199-200. Apr.-June 1979. SFA 24(3)
[Box 391, Garibaldi Highlands, Squamish, BC V0N 1T0, Canada] Fourteen specimens of Northern Brook Lamprey, /Ichthyomyzon fossor/, were collected from the Birch River, a tributary to the Winnipeg River in southeastern Manitoba on 8 and 13 May 1977. This represents the first record of this species in the Nelson River drainage and is a significant extension of the presently known range.

79-002169 Kendall, A. W., Jr.; Walford, L. A. SOURCES AND DISTRIBUTION OF BLUEFISH, /POMATOMUS SALTATRIX/, LARVAE AND JUVENILES OFF THE EAST COAST OF THE UNITED STATES. NOAA Fish. Bull. 77 (1): 213-227. Jan. 1979. SFA 24(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] Larval bluefish are found offshore somewhere between Cape Cod, Mass., and Palm Beach, Fla., during every season of the year. However, there appear to be two main spawning concentrations--one during spring near the western edge of the Gulf Stream in the South Atlantic Bight and the other during summer over the continental shelf of the Middle Atlantic Bight. Larvae complete development near the surface; juveniles are strongly associated with the surface. Juveniles from the spring spawning remain at sea and are carried northward past Cape Hatteras, N.C., above the edge of the continental shelf. As surface shelf water warms, they move shoreward to spend the summer in estuaries of the Middle Atlantic Bight. Bluefish spawned in summer remain at sea as juveniles or enter estuaries briefly in late summer. In fall, as the water cools, the juveniles move southward out of the Middle Atlantic Bight. It is possible that these two spawnings represent different populations. A smaller fall and winter spawning which occurs offshore south of Cape Hatteras may represent a small population resident to the South Atlantic Bight.

79-002170 Kukowski, G. E. A CHECKLIST OF THE FISHES OF THE MONTEREY BAY AREA INCLUDING ELKHORN SLOUGH, THE SAN LORENZO, PAJARO AND SALINAS RIVERS. Moss Landing Mar. Lab. Tech. Publ. 72-2. 72. June 1972. SFA 24(3)

79-002171 Kukowski, G. E. RESULTS OF THE SEA GRANT FISHES SAMPLING PROGRAM FOR THE 1971-1972 SEASON. Moss Landing Mar. Lab. Tech. Publ. 73-6. 48p. May 1973. SFA 24(3)

79-002172 Lehtonen, P. B. COLORADO SNAPPER, /LUTJANUS COLORADO/, TAKEN NEAR MORRO BAY ADDS NEW FAMILY (LUTJANIDAE) TO CALIFORNIA'S MARINE FISH FAUNA. Calif. Fish Game 65 (2): 120-122. Apr. 1979. SFA 24(3)
[Calif. Dep. Fish Game, Mar. Resour. Lab., 213 "E" Beach St., Morro Bay 93442]

79-002173 MacCrimmon, H. R.; Gots, B. L. WORLD DISTRIBUTION OF ATLANTIC SALMON, /SALMO SALAR/. J. Fish. Res. Board Can. 36 (4): 422-457. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

79-002174 Maughan, O. E. FISH POPULATIONS ABOVE AND BELOW POTHOLES RESERVOIR, CRAB CREEK, WASHINGTON. J. Idaho Acad. Sci. 14 (2): 39-41. Dec. 1978. SFA 24(3)
[Okla. Coop. Fish. Res. Unit, Okla. State Univ., Stillwater 74074] The Potholes Reservoir in eastern Washington has apparently served as a focal point for the extension of range of exotic species of fish downstream but not upstream. Five of eight species collected below the reservoir were exotics; three of ten species collected above the reservoir were exotics.

79-002175 Minami, T.; Nakamura, I. SEASONAL OCCURRENCE OF PELAGIC STAGES OF FLATFISHES (PLEURONECTIFORMES) IN THE COASTAL WATERS OF WESTERN WAKASA BAY, THE JAPAN SEA. Mem. Coll. Agric. Kyoto Univ. No. 112. p. 29-47. Nov. 1978. SFA 24(3)
[Dep. Fish., Kyoto Univ., Kyoto, Japan]

79-002176 Moulton, L. I. AN ECOLOGICAL ANALYSIS OF FISHES INHABITING THE ROCKY NEARSHORE REGIONS OF NORTHERN PUGET SOUND, WASHINGTON. Ph.D. dissertation, Univ. Wash. 194p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):534. Aug. 1978. SFA 24(3)

79-002177 Nakanishi, T. COMPARISON OF ECOLOGICAL GEOGRAPHICAL DISTRIBUTIONS AMONG THE THREE TYPES OF /CHAENOGOBIUS ANNULARIS/ GILL. Bull. Fac. Fish. Hokkaido Univ. 29 (3): 233-242. Sept. 1978. In Japanese with English summ. SFA 24(3)
[Lab. Embryol. Genet., Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-002178 Schlueter, R. A.; Price, W. W. SEASONAL ABUNDANCE, GROWTH AND REPRODUCTION OF FISHES CAUGHT BY SEINING IN MCKAY BAY, TAMPA BAY SYSTEM, FL. Fla. Sci. 42 (Suppl. 1): 23. 1979. Abstract only. SFA 24(3)
[Univ. Tampa, Tampa, FL 33606]

79-002179 Shen, S.-C.; Choi, Y.-H. ECOLOGICAL AND MORPHOLOGICAL STUDY ON FISH-FAUNA FROM THE WATERS AROUND TAIWAN AND ITS ADJACENT ISLANDS. 16. STUDY ON THE LABRID FISHES (LABRIDAE). Rep. Inst. Fish. Biol. Minist. Econ. Aff. Natl. Taiwan Univ. 3 (3): 68-126. Aug. 1978. SFA 24(3)
[Inst. Fish. Biol., Natl. Taiwan Univ., Taipei, Taiwan]

79-002180 Shvetsov, F. G. DISTRIBUTION AND MIGRATIONS OF THE ROCK SOLE, /LEPIDOPSETTA BILINEATA BILINEATA/, IN THE REGION OF THE OKHOTSK SEA COAST OF PARAMUSHIR AND SHUMSHU ISLANDS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 56-62. 1978. SFA 24(3)
[Sakhalin Branch, Pac. Res. Inst. Sea Fish. Oceanogr., USSR]

79-002181 Smith, G. B. RELATIONSHIP OF EASTERN GULF OF MEXICO REEF-FISH COMMUNITIES TO THE SPECIES EQUILIBRIUM THEORY OF INSULAR BIOGEOGRAPHY. J. Biogeogr. 6 (1): 49-61. Mar. 1979. SFA 24(3)
[Fla. Dep. Nat. Resour., 100 8th Ave. SE, St. Petersburg 33701]

79-002182 Swaidner, J. E.; Berra, T. M. ECOLOGICAL ANALYSIS OF THE FISH DISTRIBUTION IN GREEN CREEK, A SPRING-FED STREAM IN NORTHERN OHIO. Ohio J. Sci. 79 (2): 84-92. Mar. 1979. SFA 24(3)
[Dep. Zool., Ohio State Univ., Mansfield 44906] The distribution of fishes in Green Creek, a spring-fed tributary of Sandusky Bay in northern Ohio, was studied from June 1976 through June 1977. A total of 31 species representing 22 genera and 10 families was taken at 8 stations along the length of the creek. Two cold water springs interrupt the longitudinal succession of fishes and cause the stream to be divided into 4 divisions, each with its own ecological characteristics and fauna: I. Upland warm water tributaries with /Catostomous commersoni/ and cyprinids dominant. II. Cold water trout stream produced by stocking /Salmo gairdneri/ near the spring; /Cottus bairdi/ is an abundant native species in this division. III. Marl

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substrate of low gradient with /Catostomous commersoni/, cyprinids, darters, and /Cottus bairdi/. IV. Estuary of Lake Erie with typical lake fishes. The stations with the highest macroinvertebrate biomass also had the highest fish biomass. Various physical and chemical measurements were made, and it was determined that the marl deposits of the springs were not conducive to fish productivity. The distribution of fishes in Green Creek does not follow the classical pattern of longitudinal zonation but is determined by the unusual physical and chemical parameters induced by the springs.

79-002183 Talbot, F. H.; Russell, B. C.; Anderson, G. R. V. CORAL REEF FISH COMMUNITIES: UNSTABLE, HIGH-DIVERSITY SYSTEMS? Ecol. Monogr. 48 (4): 425-440. 1978. SFA 24(3)
[Cent. Environ. Stud., Macquarie Univ., North Ryde, N.S.W. 2113, Australia]

79-002184 Thomson, K. S.; Weed, W. H. III; Taruski, A. G.; Simanek, D. E. SALTWATER FISHES OF CONNECTICUT. State Geol. Nat. Hist. Surv. Conn. Bull. 105. viii + 186p. 1978. SFA 24(3)
[State Geol. Nat. Hist. Surv., Hartford, CT]

79-002185 Wang, J. C. S.; Kernehan, R. J. FISHES OF THE DELAWARE ESTUARIES: A GUIDE TO THE EARLY LIFE HISTORIES. EA Communications, Towson, MD 350p. 1978. Available at $22.50 plus $1.50 handling and postage from EA communications, Ecological Analysts, Inc., York Bldg., 8600 LaSalle Rd., Towson, MD 21204. SFA 24(3)
This publication provides a comprehensive analysis and key for the early life stages of 112 species of freshwater, estuarine, and marine fishes found in the Delaware Bay region. Its unprecendented scope and detail make it an essential library source and an important companion volume for use in course work, and its spiral binding and sturdy design make it a convenient and long-wearing manual for laboratory and field studies. The authors have presented dichotomous keys to differentiate species within families, which then leads to individual descriptions of species to elucidate features of the eggs, prolarvae, postlarvae, and young. Spatial, temporal, and life-stage differences in distribution, morphology, and ecology are discussed for each species, as are observed and previously reported spawning habits and seasonal occurrences. Over 600 illustrations, many of which have never been published before, are incorporated in the text. Included with the discussions of each species are extensive, up-to-date lists of references that provide additional information. The literature citations total some 750 entries.--From Publisher.

79-002186 Winstanley, R. H. RESULTS OF OTTER TRAWLING BY THE F.V. /BATTLE AXE/ IN CENTRAL VICTORIAN COASTAL WATERS. Victoria Fish. Wildl. Pap. No. 18. 17p. Jan. 1979. SFA 24(3)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., Brown St., Heidelberg, Victoria 3084, Australia]

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

79-002187 Bernard, D. R. A TEST OF THE VARIABLE NATURE OF DENSITY-DEPENDENT MORTALITY IN FISH POPULATIONS. Ph.D. dissertation, Va. Polytech. Inst. State Univ. 213p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5209. May 1979. SFA 24(3)

79-002188 Bullock, L. H.; Smith, G. B. IMPACT OF WINTER COLD FRONTS UPON SHALLOW-WATER REEF COMMUNITIES OFF WEST-CENTRAL FLORIDA. Fla. Sci. 42 (3): 169-172. 1979. SFA 24(3)
[Mar. Res. Lab., 100 8th Ave. S.E., St. Petersburg, FL 33701] Shallow-water (12-37 m) eastern Gulf of Mexico reef biotas suffered damage during the exceptionally cold winters of 1977 and 1978. Certain fishes were killed or sustained injury either directly from the cold or from physical abrasion against the reef during heavy bottom surge accompanying cold front passage. Reef corals were overturned or torn from their reef attachment during periods of heavy bottom surge. Recovery time for these impacts is not known.

79-002189 Coffin, P. IMPACTS OF THE 1976-77 DROUGHT ON NORTHERN NEVADA FISHERIES. Cal-Neva Wildl. Trans. p. 7-13. 1978. SFA 24(3)
[Nevada Dep. Fish Game, Elko] Evaluation of the drought impact upon Nevada waters entails an area of 110,000 square miles and 900 waters. Analysis of six key hydrographic regions including the Snake River Basin, Humboldt River Basin, Isolated River Basins, and Truckee, Carson, and Walker River Basins of Western Nevada provided data concerning the drought impact within Nevada. The Snake River Basin of Northeastern Nevada was lightly affected by the drought with below average precipitation only in 1977. The Humboldt River Basin was lightly involved in the drought in 1976 and seriously involved in 1977. Eighty-six percent of the streams checked had higher or similar population levels to those found in 1957. The Central Nevada Isolated Basins have no major streams although 195 small streams are present. Streamflows were below average in 1976 and 1977, but the impacts on the stream fisheries were minimal. The Truckee, Carson, and Walker River Basins were the most seriously impacted in Nevada. Streamflows from the Sierra Nevada Range into Nevada were much below normal in both 1976 and 1977. Many reservoirs were drained or drawn to minimum pool. Streamflows were low and water temperatures high by late summer. This increases predation by birds and man. The drought of 1976-77 was not as serious as the droughts of 1959-60-61 and 1953-54-55. Trout stocking programs were carried out earlier than usual in 1977. Some stocking was cancelled in anticipation of problems.

79-002190 Halling, F. AUTUMN-SPAWNING HERRING LARVAE AND THE ABUNDANCE OF COPEPODS OFF THE ALAND ISLANDS IN SEPTEMBER-NOVEMBER 1977. Int. Counc. Explor. Sea C.M. 1978/J:20. 9p. 1978. In English with French summ. SFA 24(3)
[Finnish Game Fish. Res. Inst., Fish. Div., Aland Islands Field Stn., Ohbergsvagen 3, SF-22100 Mariehamn, Finland] In autumn 1977, samples of Baltic herring larvae taken with the modified Gulf V sampler gave densities of up to 24 larvae per 10 m². The numbers decreased rapidly, however, during the autumn. According to the length of the larvae, those caught in September were the offspring of spring-spawners, those caught in October and November of autumn-spawners. The decrease of the larvae is ascribed to mortality. Mortality was high in spite of an abundance of suitable food organisms. Effective use of the food supply is presumably prevented by the shortness of the daylight

79-002190 CONTINUED
period, during which the larvae feed. In spite of this the growth of the larvae was good.

79-002191 Hickey, G. M. SURVIVAL OF FISH LARVAE AFTER INJURY. J. Exp. Mar. Biol. Ecol. 37 (1): 1-17. 22 Feb. 1979. SFA 24(3)
[Dep. Zool., Trinity Coll., Dublin 2, Ireland] Recovery from injury has been investigated in herring, /Clupea harengus/ L., plaice, /Pleuronectes platessa/ L., and salmon, /Salmo salar/ L., larvae. Yolk sac herring larvae survived amputation of up to 2 mm of the tail in sea water. Yolk sac and first feeding herring also survived an incision of 0.3 mm long through the body ventral to the notochord and dorsal to the gut; in starving larvae survival was poorer in the later stages of starvation. When skin was removed in larvae of all three species the mortality depended on the area of the lesion, the maximum area tolerated increasing with larval size. In sea water the threshold area was 0.1-0.2 mm^2 for 6-8 mm long plaice, less than 0.3 mm^2 for 10-13 mm long herring and 0.3-0.4 mm^2 for 14-17 mm long herring. In river water the threshold was 1-2mm^2 for 19-21 mm long salmon and 6.5-8mm^2 for 26-28 mm long salmon. The thresholds were 1-3 percent of the total body surface area. Tolerance was increased in isosmotic salinities, the threshold area being as high as 10-14 percent of the body surface in 24-28 mm long salmon in 8 °/oo.

79-002192 Hinton, R. N. DROUGHT IMPACTS ON FISH, WILDLIFE, AND RECREATION IN NORTHERN CALIFORNIA. Cal-Neva Wildl. Trans. p. 1-6. 1978. SFA 24(3)
[Dep. Water Resour., Red Bluff, CA 96080] The drought of the past two years was in many respects the most severe on record in California. However, although runoff in the Central Valley and Sierra Nevada areas were near record lows, many North Coast streams were well above record lows, and runoff in south coastal basins was near normal. The postive effects of the drought included greatly increased efforts at conservation of water and energy by both municipal and agricultural users. Hopefully, both sectors acquired lasting waster-conservation habits. Anadromous fish, and fish living in middle elevation streams and some reservoirs, were hard hit by the drought. Fish and wildlife species are generally expected to recover quickly from the effects of the drought if suitable habitat is available. Recreation at major North State reservoirs was greatly reduced, although a few smaller reservoirs and natural lakes escaped serious impact. White-water boating was greatly restricted last spring. The Spring Creek pollution problem on the Sacramento River near Redding received much greater attention this year than in the past and a major fish kill was apparently averted. Understanding of the problem has increased substantially and may lead to a permanent solution. The political implications of the drought are important. SB 345, which would have repealed the State's Wild and Scenic Rivers Act, and AB 1653, which would have weakened the Act, are examples of proposed legislation threatening fish and wildlife which resulted from the drought. The recent proposal to construct three major dams on the Eel River as an alternative to SB 346 will be important legislation to watch.

79-002193 Lasker, R.; Smith, P. E. ESTIMATION OF THE EFFECTS OF ENVIRONMENTAL VARIATIONS ON THE EGGS AND LARVAE OF THE NORTHERN ANCHOVY. Calif. Coop. Oceanic Fish Invest. Rep. 19: 128-137. Oct. 1977. SFA 24(3)

[NMFS, Southwest Fish. Cent., La Jolla, CA 92038] Changes in anchovy spawning are compared to seasonal and annual variations in sea water temperature, vertical temperature gradients, upwelling, California Current speed, flushing rate of the Southern California Bight, and secondary production. It appears that the usual habit of the anchovy to spawn in the southern California area in winter, alters radically in some years. The cause for this is not yet known. Quarterly apparent mortality rates are assembled for the years of greatest environmental changes in the southern California regions for anchovy eggs and larvae (to 6.25 mm). New biological information needed for analyzing the causes of anchovy larval mortality has been assembled. For example, first feeding anchovy larvae require abundant food in a narrow size range and of particular species. /Gymnodinium splendens/, a naked dinoflagellate about 40um in diameter, supports growth when it occurs in concentrations of 20 or more cells per ml. Tests with laboratory reared larvae have confirmed the existence of suitable strata of larval food organisms in nearshore waters which are associated with chlorophyll maximum layers at 15-30 m depth. Storms were observed to disperse the food organisms until they were too low in number to support larval growth.

79-002194 Reiser, D. W.; Wesche, T. A. /IN SITU/ FREEZING AS A CAUSE OF MORTALITY IN BROWN TROUT EGGS. Prog. Fish-Cult. 41 (2): 58-60. Apr. 1979. SFA 24(3)

[Idaho Coop. Fish. Res. Unit, Coll. For., Univ. Idaho, Moscow 83843]

79-002195 Stasenkov, V. A. THE INFLUENCE OF CERTAIN FACTORS ON YEAR-CLASS STRENGTH OF THE NAVAGA, /ELEGINUS NAVAGA/, OF THE WHITE SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 29-35. 1978. SFA 24(3)

The influence of various factors on year-class strength of local stocks of the navaga, /Eleginus navaga/, of the White Sea was studied. Fluctuations are connected to larval survival during the period of transition to mixed feeding. The survival of the larvae depends on food abundance and the thermal regime in the spring. In the Gulf of Mezen and the White Sea "Funnel", there are favorable conditions for the formation of strong navaga year-classes in years with a warm spring, and in the Dvina and Onega Bays in years with a cold spring.

79-002196 Votinov, N. P.; Kas'yanov, V. F. THE ECOLOGY AND REPRODUCTIVE EFFICIENCY OF THE SIBERIAN STURGEON, /ACIPENSER BAERI/, IN THE OB AS AFFECTED BY HYDRAULIC ENGINEERING WORKS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 20-29. 1978. SFA 24(3)

[Sibrybniiproyekt, Tyumen, USSR] Results of observations carried out on the reproduction of the Siberian sturgeon, /Acipenser baeri/, in the Upper Ob and on the downstream migration of its young during the period 1968-1974 are presented. The direct relationship between water levels in the region of the spawning grounds during the spawning period and recruitment as a result of dams, is mainly due to a shift in the times of peak flows and a reduction in the peak flows.

79-002197 Vyshegorodtsev, V. A. CASES OF MASS MORTALITY OF THE WALLEYE POLLOCK, /THERAGRA CHALCOGRAMMA/, IN THE SEA OF OKHOTSK. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 146-148. 1978. SFA 24(3)
[Pac. Res. Inst. Fish. Oceanogr., Magadan, USSR] We thus consider epizootic diseases, the lethal action of which is manifested in combination with factors of the external environment, in particular with the thermal regime of the sea generally and in areas of reproduction in particular, as the direct cause of mass mortality in the walleye pollock. Finally it should be noted that the conclusion arrived at does not do away with the need for additional study of the question with the assistance of qualified parasitologists. In addition to providing a definitive answer to the question of why there is mass mortality of the walleye pollock, a biological and ecological study of the parasitic fauna of the dead fish will provide valuable material for an understanding of the specifics of conditions of existence and for establishing the degree of isolation of walleye groupings living in various regions of the Sea of Okhotsk.--From text.

IDENTIFICATION, KEYS, CLASSIFICATION

79-002198 Burr, B. M. SYSTEMATICS AND LIFE HISTORY ASPECTS OF THE PERCID FISH /ETHEOSTOMA BLENNIUS/ WITH DESCRIPTION OF A NEW SUBSPECIES FROM SEQUATCHIE RIVER, TENNESSEE. Copeia 1979 (2): 191-203. 18 May 1979. SFA 24(3)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

79-002199 Butler, J. L. THE NOMEID GENUS /CUBICEPS/ (PISCES) WITH A DESCRIPTION OF A NEW SPECIES. Bull. Mar. Sci. 29 (2): 226-241. Apr. 1979. SFA 24(3)
[NMFS, Southwest Fish. Cent., La Jolla, CA 92038]

79-002200 Cohen, D. M.; Russo, J. L. VARIATION IN THE FOURBEARD ROCKLING, /ENCHELYOPUS CIMBRIUS/, A NORTH ATLANTIC GADID FISH, WITH COMMENTS ON THE GENERA OF ROCKLINGS. NOAA Fish. Bull. 77 (1): 91-104. Jan. 1979. SFA 24(3)
[NMFS, Natl. Mus. Nat. Hist., Washington, DC 20560]

79-002201 Conner, J. V. IDENTIFICATION OF LARVAL SUNFISHES (CENTRARCHIDAE, ELASSOMATIDAE) FROM SOUTHERN LOUISIANA. IN F. D. Hoyt, ed. Proceedings of the Third Symposium on Larval Fish. Western Kentucky University, Bowling Green 3: 17-52. 1979. SFA 24(3)
[Sch. For. Wildl. Manage., La. State Univ., Baton Rouge 70803]

79-002202 Cooper, J. E. DESCRIPTION OF EGGS AND LARVAE OF FANTAIL (/ETHEOSTOMA FLABELLARE/) AND RAINBOW (/E. CAERULEUM/) DARTERS FROM LAKE ERIE TRIBUTARIES. Trans. Am. Fish. Soc. 108 (1): 46-56. Jan. 1979. SFA 24(3)
[Appalachian Environ. Lab., Univ. Md., Frostburg 21532]

79-002203 Dawson, C. E. A NEW WORMFISH (PISCES: MICRODESMIDAE) FROM THE EASTERN TROPICAL ATLANTIC. Copeia 1979 (2): 203-205. 18 May 1979. SFA 24(3)
[Gulf Coast Res. Lab. Mus., Ocean Springs, MS 39564]

79-002204 Eschmeyer, W. N.; Dor, M. /OCCCTROPUS STEINITZI/, A NEW SPECIES OF THE FISH FAMILY APICACTINIDAE (PISCES: SCORPAENIFORMES) FROM THE RED SEA AND ANDAMAN ISLANDS. Isr. J. Zool. 27 (4): 165-168. 1978. SFA 24(3)
[Calif. Acad. Sci., Golden Gate Park, San Francisco 94118]

79-002205 Fisher, I. E., Jr. RECLASSIFICATION OF THE TELEOSTEAN FISHES RELATED TO THE ECHENEIDAE. Fla. Sci. 42 (Suppl. 1): 23. 1979. Abstract only. SFA 24(3)
[Fla. Atl. Univ., Boca Raton 33431]

79-002206 Gould, W. R. THE IDENTITY OF /HYBOGNATHUS NUCHALIS/ (CYPRINIDAE) IN MONTANA. Proc. Mont. Acad. Sci. 38: 11-12. 1979. SFA 24(3)
[Coop. Fish. Res. Unit., Mont. State Univ., Bozeman 59717] The species formerly known as /Hybognathus nuchalis/ in Montana now is designated /H. argyritis/.

79-002207 Greenfield, D. W. A REVIEW OF THE WESTERN ATLANTIC /STARKSIA OCELLATA/-COMPLEX (PISCES: CLINIDAE) WITH THE DESCRIPTION OF TWO NEW SPECIES AND PROPOSAL OF SUPERSPECIES STATUS. Fieldiana Zool. 73 (2): 9-48. 28 Feb. 1979. SFA 24(3)
[Div. Fish., Field Mus. Nat. Hist., Chicago, IL]

79-002208 Hureau, J.-C.; Staiger, J. C.; Nielsen, J. G. A NEW SPECIES OF DEEP-SEA BROTULID FISH, /TYPHLONUS DIOSOMMATUS/, FROM THE TROPICAL ATLANTIC OCEAN. Bull. Mar. Sci. 29 (2): 272-277. Apr. 1979. SFA 24(3)
[Lab. Ichthyol. Gen. Appl., Mus. Natl. Hist. Nat., 43 Rue Cuvier, 7523 Paris Cedex 05, France]

79-002209 Isbrucker, I. J. H.; Nijssen, H. THREE NEW SOUTH AMERICAN MAILED CATFISHES OF THE GENERA /RINELORICARIA/ AND /ICRICARIICHTHYS/ (PISCES, SILURIFORMES, LORICARIIDAE). Bijdr. Dierkd. 48 (2): 191-211. 1979. SFA 24(3)
[Inst. Taxon. Zool., Univ. Amsterdam, The Netherlands]

79-002210 Johnson, G. D. LIMITS AND RELATIONSHIPS OF THE LUTJANIDAE AND ASSOCIATED FAMILIES. Ph.D. dissertation, Univ. Calif. (San Diego) 227p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1659. Oct. 1978. SFA 24(3)

79-002211 Nekrasov, V. V. SYSTEMATIC POSITION OF HORSE MACKEREL OF THE GENUS /TRACHURUS/ FROM THE WESTERN PART OF THE INDIAN OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 15-19. 1978. SFA 24(3)
[VNIRO, Moscow, USSR] Horse mackerel of the genus /Trachurus/ are widely distributed in the western part of the Indian Ocean and are represented by three species: /T. indicus/ Nekrassov, /T. delagoa/ Nekrassov and /T. trachurus capensis/ Castelnau. The species /T. margaretae/ described by Berry and Cohen (1972), is a synonym of the species /T. delagoa/. The error of some authors in recognizing /T. trachurus capensis/ as a full species is also demonstrated.

79-002212 Nelson, J. S. /PEMBROPS MORELANDI/, A NEW PERCOPHIDID FISH FROM NEW ZEALAND, WITH NOTES ON OTHER MEMBERS OF THE GENUS. Natl. Mus. N.Z. Rec. 1 (14): 237-241. Oct. 1978. SFA 24(3)
[Dep. Biol., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

79-002213 Pinchuk, V. I. NOTES AND SUPPLEMENTS TO THE FAMILY GOBIIDAE IN THE BOOK BY LINDBERG AND KRASYUKOVA "FISH OF THE SEA OF JAPAN AND THE NEIGHBORING PARTS OF THE SEA OF OKHOTSK AND THE YELLOW SEA", PART 4, 1975 WITH A DESCRIPTION OF A NEW SPECIES /CHAENOGOBIUS TARANETZI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 1-14. 1978. SFA 24(3)
[Inst. Mar. Biol., Far East. Sci. Cent., USSR Acad. Sci., Vladivostok, USSR] New data are presented on the ranges and biotopes of species of the family Gobiidae. The validity of the subspecies /Rhinogobius brunneus lindbergi/ is confirmed. The correctness of Takagi's revision (1966) of the genus /Chaenogobius/, which is supplemented by conclusions on the status of /Gymnogobius taninus/ and by a description of a species new to science, /Chaenogobius taranetzi/, is confirmed. Two new species of the fauna of the USSR are also recorded.

79-002214 Randall, J. E.; Nelson, G. /SCARUS JAPANENSIS/, /S. QUOYI/ AND /S. ISERTI/--VALID NAMES FOR PARROTFISHES PRESENTLY KNOWN AS /S. CAPISTRATOIDES/, /S. BLOCHII/ AND /S. CROICENSIS/. Copeia 1979 (2): 206-212. 18 May 1979. SFA 24(3)
[Bernice P. Bishop Mus., Box 6037, Honolulu, HI 96818]

79-002215 Rivas, L. R. A NEW SPECIES OF POECILIID FISH OF THE GENUS /POECILIA/ FROM HISPANIOLA, WITH REINSTATEMENT AND REDESCRIPTION OF /P. DOMINICENSIS/ (EVERMANN AND CLARK). Northeast Gulf Sci. 2 (2): 98-112. Dec. 1978. SFA 24(3)
[NMFS, 75 Virginia Beach Dr., Miami, FL 33149]

79-002216 Sydenham, D. H. J. REDESCRIPTIONS OF THE TYPE SPECIMENS OF SIX CLARID SPECIES (PISCES) FROM WESTERN AFRICA. Zool. J. Linn. Soc. 64 (4): 347-371. Dec. 1978. SFA 24(3)
[Zool. Dep., Univ. Ibadan, Nigeria]

79-002217 Tyler, J. C.; Paxton, J. R. NEW GENUS AND SPECIES OF PUFFERFISH (TETRAODONTIDAE) FROM NORFOLK ISLAND, SOUTHWEST PACIFIC. Bull. Mar. Sci. 29 (2): 202-215. Apr. 1979. SFA 24(3)
[NMFS, Off. Endangered Species, Washington, DC 20235]

79-002218 Vladykov, V. D.; Kott, E. A NEW PARASITIC SPECIES OF THE HOLARCTIC LAMPREY GENUS /ENTOSPHENUS/ GILL, 1862 (PETROMYZONIDAE) FROM KLAMATH RIVER, IN CALIFORNIA AND OREGON. Can. J. Zool. 57 (4): 808-823. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Biol., Univ. Ottawa, Ottawa, ON, Canada]

79-002219 Vladykov, V. D.; Kott, E. SATELLITE SPECIES AMONG THE HOLARCTIC LAMPREYS (PETROMYZONIDAE). Can. J. Zool. 57 (4): 860-867. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Biol., Univ. Ottawa, Ottawa, ON, Canada]

79-002220 Vrooman, A. M.; Paloma, P. A. DWARF HAKE OFF THE COAST OF BAJA CALIFORNIA, MEXICO. Calif. Coop. Oceanic Fish Invest. Rep. 19: 67-72. Oct. 1977. SFA 24(3)
[NMFS, Southwest Fish. Cent., La Jolla, CA 92038] Dwarf hake found in southern California is compared to /Merluccius productus/, the common hake found along the western coast of the United States, through morphometric measurements, meristic counts, and the electrophoresis of tissue proteins from the eye lens, vitreous humor, and muscle myogens. Dwark hake differs significantly from /M. productus/ to suggest it may be a separate species and does not interbreed with either /M. productus/ or the rarer /M. angustimanus/.

79-002221 Zander, C. D. KRITISCHE ANMERKUNGEN ZUR "REVISION DER BLENNIINI (PISCES: BLENNIIDAE)" VON H. BATH (1977). [CRITICAL REMARKS ON "REVISION OF BLENNIINI (PISCES: BLENNIIDAE)" BY H. BATH (1977).] Z. Zool. Syst. Evolutionsforsch. 16 (4): 290-296. Dec. 1978. In German with English and French summ. SFA 24(3)
[Zool. Inst. Mus., Martin-Luther-King-Platz 3, D-2000 Hamburg 13, West Germany]

PARASITES AND DISEASES-GENERAL

79-002222 Bowen, C. A.; Crites, J. L. PARASITES OF THE BRINDLED MADTOM, /NOTURUS MIURUS/ (JORDAN) IN CENTRAL OHIO. Ohio J. Sci. 79: 7. Apr. 1979. Abstract only. SFA 24(3)
[U.S. EPA, 401 M St., SW, Washington, DC 20460] Three hundred and forty four Brindled madtoms (/Noturus miurus/) were collected from Salt Creek, Ohio, over a two year period (Oct. 1974-Sept. 1975; April 1977-July 1977). The majority (234) of the specimens autopsied were preserved in individual bottles containing a buffered solution of 10 percent formalin at the time of collection. The remaining 68 madtoms consisted of freshly posted specimens. Parasites collected included one species of monogenetic trematode, two species of digenetic trematodes, one species of cestode, two species of nematodes, one species of hirudinea, and one species of branchiura. Of the eight species recovered seven represent new host records. With the exception of the parasitic cestode, the incidence of parasitic infection was low with only 8 percent of the madtoms surveyed being parasitized. Cestodes recovered were primarily in the form of encapsulated plerocercoid larvae that infected 89.5 percent (males = 89.9 percent

79-002222 CONTINUED
and females = 90.0 percent) of the population. The mean worm burden values were 35.19 (range 18-76) and 28.1 (range 1-59) for male and females respectively.

79-002223 Boxrucker, J. C. EFFECTS OF A THERMAL EFFLUENT ON THE INCIDENCE AND ABUNDANCE OF THE GILL AND INTESTINAL METAZOAN PARASITES OF BLACK BULLHEAD. Parasitology 78 (2): 195-206. Apr. 1979. SFA 24(3)
[Okla. Fish. Res. Lab., 1416 Planck St., Norman 73069]

79-002224 Bulow, F. J.; Anderson, R. D. TISSUE PRESS TECHNIQUE FOR COUNTING FISH LIVER PARASITES. Prog. Fish-Cult. 41 (2): 73. Apr. 1979. SFA 24(3)
[Dep. Biol., Tenn. Tech. Univ., Cookeville 38501]

79-002225 Crosby, M. D. PRELIMINARY PARASITE SURVEY OF BLUEGILL (/LEPOMIS MACROCHIRUS/) FROM LAKE CARROLL. Ga. J. Sci. 37 (2): 62-63. Apr. 1979. Abstract only. SFA 24(3)
[West Georgia Coll., Carrollton]

79-002226 Hine, P. M. DISTRIBUTION OF SOME PARASITES OF FRESHWATER EELS IN NEW ZEALAND. N.Z. J. Mar. Freshwater Res. 12 (2): 179-187. June 1978. SFA 24(3)
[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19062, Wellington, New Zealand]

79-002227 Holt, R. A.; Sanders, J. E. WHAT'S WRONG WITH THIS FISH? Oreg. Wildl. 34 (4): 3-6. Apr. 1979. SFA 24(3)
[Oreg. State Dep.Fish. Wildl., Portland]

79-002228 Pal, R. N. ROLE OF FISH PATHOLOGY IN AQUACULTURE. J. Inland Fish. Soc. India 7: 131-136. Dec. 1975. SFA 24(3)

79-002229 Paperna, I.; Baudin Laurencin, F. PARASITIC INFECTIONS OF SEA BASS, /DICENTRARCHUS LABRAX/, AND GILT HEAD SEA BREAM, /SPARUS AURATA/, IN MARICULTURE FACILITIES IN FRANCE. Aquaculture 16 (2): 173-175. Feb. 1979. SFA 24(3)
[H. Steinitz Mar. Biol. Lab., Hebrew Univ. Jerusalem, Elat, Israel] Parasitic infections occur in sea cultured /Sparus aurata/ and /Dicentrarchus labrax/ in France. Investigations indicate the presence of parasitic protozoans, monogeneans and copepods in these fish.

79-002230 Skinner, R. H. THE INTERRELATION OF WATER QUALITY, EXTERNAL PARASITES AND GILL PATHOLOGY OF SOME FISHES FROM BISCAYNE BAY, FLORIDA. Ph.D. dissertation, Univ. Miami 115p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(4):1585. Oct. 1978. SFA 24(3)

79-002231 Sutherland, D. R.; Holloway, H. L., Jr. PARASITES OF FISH FROM THE MISSOURI, JAMES, SHEYENNE, AND WILD RICE RIVERS IN NORTH DAKOTA. Proc. Helminthol. Soc. Wash. 46 (1): 128-134. Jan. 1979. SFA 24(3)
[Zool. Dep., Iowa State Univ., Ames 50011]

79-002232 Thompson, P.-A.; Threlfall, W. THE METAZOAN PARASITES OF TWO SPECIES OF FISH FROM THE PORT-CARTIER-SEPT-ILES PARK, QUEBEC. Nat. Can. (Que.) 105 (5): 429-431. Sept.-Oct. 1978. In English with French summ. SFA 24(3)
[16 rue Ti-basse, Port-Cartier, PQ, Canada]

BACTERIAL DISEASES

79-002233 Banowetz, G. M. BACTERICIDAL AND PHYSICO-CHEMICAL PROPERTIES OF A LECTIN DERIVED FROM SPRING CHINOOK SALMON (/ONCORHYNCHUS TSHAWYTSCHA/) CVA. Ph.D. dissertation, Oreg. State Univ. 97p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(2):556. Aug. 1978. SFA 24(3)

79-002234 Eurell, T. E.; Lewis, D. H.; Grumbles, L. C. STAINED BACTERIAL ANTIGENS FOR USE IN MICROAGGLUTINATION PROCEDURES. Prog. Fish-Cult. 41 (2): 55-57. Apr. 1979. SFA 24(3)
[Dep. Vet. Microbiol., Tex. A&M Univ., College Station 77843]

79-002235 Fluchter, J. IDENTIFICATION AND TREATMENT OF DISEASES IN THE COMMON SOLE (/SOLEA SOLEA/ L.). Aquaculture 16 (3): 271-274. Mar. 1979. SFA 24(3)
[Bayerische Landesanstalt Fisch., Starnberg, West Germany] Three bacterial diseases (tailrot, furunculosis and red-spot disease) are described. A /Pseudomonas/ was associated with the first two and a /Vibrio/ with the third. Tailrot and furunculosis could be cured by treating the fish with antibiotics, but red-spot disease could not because of its very rapid progression and late on-set of signs. Ectoparasites probably facilitate the entry of disease organisms.

79-002236 Gould, R. W.; Antipa, R.; Amend, D. F. IMMERSION VACCINATION OF SOCKEYE SALMON (/ONCORHYNCHUS NERKA/) WITH TWO PATHOGENIC STRAINS OF /VIBRIO ANGUILLARUM/. J. Fish. Res. Board Can. 36 (2): 222-225. Feb. 1979. In English with French summ. SFA 24(3)
[U.S. FWS, Natl. Fish. Res. Cent., Naval Support Activity, Seattle, WA 98115]

79-002237 Kuo, S.-C.; Kou, G.-H. [/PSEUDOMONAS ANGUILLISEPTICA/ ISOLATED FROM RED SPOT DISEASE OF POND-CULTURED EEL, /ANGUILLA JAPONICA/.] Rep. Inst. Fish. Biol. Minist. Econ. Aff. Natl. Taiwan Univ. 3 (3): 19-23. Aug. 1978. In Chinese with English summ. SFA 24(3)
[Dep. Zool., Coll. Sci., Natl. Taiwan Univ., Taipei, Taiwan]

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[Mar. Prog., Univ. N.H., Durham 03824]

PROTOZOAN DISEASES

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79-002241 Kirmse, P. THE ULTRASTRUCTURE OF /HAEMOGREGARINA SACHAI/ (COCCIDIA; ADELEIDEA) FROM THE FARMED MARINE FLATFISH /SCOPHTHALMUS MAXIMUS/ L. Z. Parasitenkd. 58 (3): 201-210. 1979. SFA 24(3)
[Inst. Parasitol. Trop. Vet. Med., Konigsweg 65, D-1000 Berlin 37, West Germany]

79-002242 Lowe-Jinde, L. SOME OBSERVATIONS OF RAINBOW TROUT, /SALMO GAIRDNERI/, RICHARSON, INFECTED WITH /CRYPTOBIA SALMOSITICA/. J. Fish Biol. 14 (3): 297-302. Mar. 1979. SFA 24(3)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Rainbow trout (/Salmo gairdneri/) were infected with an inoculum of infected blood containing 10^6 /Cryptobia salmositica/. Parasitaemia was cyclical with a major peak at 14-21 days and a smaller peak at 42 days. The first peak of parasitaemia was correlated with low glucose, plasma proteins, and haematocrit levels. During this time clinical symptoms (exophthalmia, ascites, pale liver and gills) of the pathogenic condition were observed. The partial disappearance of the parasites from the blood was correlated with their appearance in the peritoneal cavity. As plasma glucose, proteins, and haematocrit levels returned towards control values, the oedema and gill paleness declined. Examination of the liver and spleen showed an exudate of fibrous matrix on their exterior surfaces. In addition, the presence of 2-4 x 10^3 mm^{-3} /Cryptobia/ in asymptomatic surviving fish suggests that a chronic parasitaemia can be tolerated.

79-002243 Woo, P. T. K. /TRYPANOPLASMA SALMOSITICA/: EXPERIMENTAL INFECTIONS IN RAINBOW TROUT, /SALMO GAIRDNERI/. Exp. Parasitol. 47 (1): 36-48. Feb. 1979. SFA 24(3)
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VIRAL DISEASES

79-002244 Blackstone, S. C. A VIRUS CONCENTRATION SYSTEM FOR THE ISOLATION OF INFECTIOUS PANCREATIC NECROSIS VIRUS FROM FISH HATCHERY WATER. Ph.D. dissertation, Univ. N.H. 91p. 1977. From Diss. Abstr. Int. B Sci. Eng. 39(2):558. Aug. 1978. SFA 24(3)

79-002245 Bowser, P. R. DEVELOPMENT AND EVALUATION OF A NEW CELL LINE FROM THE CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. Ph.D. dissertation, Auburn Univ. 56p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(9):4120. Mar. 1979. SFA 24(3)

79-002246 Savan, M.; Budd, J.; Reno, P. W.; Darley, S. A STUDY OF TWO SPECIES OF FISH INOCULATED WITH SPRUCE BUDWORM NUCLEAR POLYHEDROSIS VIRUS. J. Wildl. Dis. 15 (2): 331-334. Apr. 1979. SFA 24(3)
[Dep. Pathol., Ontario Vet. Coll., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Preliminary studies conducted on rainbow trout (/Salmo gairdneri/) and white suckers (/Castostomus commersoni/) exposed to spruce budworm nuclear polyhedrosis virus revealed minor histopathologic changes in various organs of each fish which were interpreted as not being significant. However, an evaluation (mean values) of the total changes in groups of fish suggested that a relationship may exist in the suckers exposed to either purified polyhedra or virions. A more extensive and definitive study must be done before any conclusions are warranted.

79-002247 Swanson, R. N.; Gillespie, J. E. PATHOGENESIS OF INFECTIOUS PANCREATIC NECROSIS IN ATLANTIC SALMON (/SALMO SALAR/). J. Fish. Res. Board Can. 36 (5): 587-591. May 1979. In English with French summ. SFA 24(3)
[Dep. Microbiol., N.Y. State Coll. Vet. Med., Cornell Univ., Ithaca 14853]

79-002248 Yamamoto, T.; Kilistoff, J. INFECTIOUS PANCREATIC NECROSIS VIRUS: QUANTIFICATION OF CARRIERS IN LAKE POPULATIONS DURING A 6-YEAR PERIOD. J. Fish. Res. Board Can. 36 (5): 562-567. May 1979. In English with French summ. SFA 24(3)
[Dep. Microbiol., Univ. Alberta, Edmonton, AB T6G 2E9, Canada]

OTHER DISEASES AND PARASITES

79-002249 Andryuk, L. V. [THE CYCLE OF DEVELOPMENT OF /ACANTHOCEPHALUS ANGUILLAE/.] Zool. Zh. 58 (2): 168-174. Feb. 1979. In Russian with English summ. SFA 24(3)
[Smolensk Div. Moscow Agric. Acad., Moscow, USSR]

79-002250 Avdeev, G. V.; Avdeev, V. V. [/PSEUDONICOTHCE BRANCHIALIS/ GEN. ET SP. N. (CRUSTACEA, COPEPODA) FROM GILLS OF /HETEROCARPUS LAEVIGATUS/ FROM THE PACIFIC OCEAN.] Zool. Zh. 57 (12): 1893-1897. Dec. 1978. In Russian with English summ. SFA 24(3)
[Pac. Res. Inst. Fish. Oceanogr., Vladivostok, USSR]

79-002251 Barnhart, M. C.; Powell, E. C. /ILSSORCHIS KRITSKYI/ SP. N. (DIGENEA: ILSSORCHIIDAE) FROM THE RIVER CARPSUCKER, /CARPIODES CARPIO/ (RAFINESQUE). Proc. Helminthol. Soc. Wash. 46 (1): 47-51. Jan. 1979. SFA 24(3)
[Dep. Syst. Ecol., Univ. Kans., Lawrence 66044]

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79-002253 Bilqees, F. M. /TERGESTIA KARACHIENSE/ SP.N. (TREMATODA, FELLODISTOMIDAE) FROM THE FISH /STROMATEUS SINENSIS/ OF THE KARACHI COAST. Zool. Scr. 7 (4): 255-256. 1978. SFA 24(3)
[Sch. Parasitol., Dep. Zool., Univ. Karachi, Karachi, Pakistan]

79-002254 Boyce, N. P. EFFECTS OF /EUBOTHRIUM SALVELINI/ (CESTODA: PSEUDOPHYLLIDEA) ON THE GROWTH AND VITALITY OF SOCKEYE SALMON, /ONCORHYNCHUS NERKA/. Can. J. Zool. 57 (3): 597-602. Mar. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]
Sockeye salmon (/Oncorhynchus nerka/) fry infected experimentally with the cestode /Eubothrium salvelini/, as well as noninfected controls, were studied in the laboratory for approximately 1 year through their development to the smolt stage. Fish were weighed and measured at 10-day intervals and tested for stamina in an active capacity tunnel. Parasitism had a deleterious effect on the growth, survival, and swimming performance of the fish.

79-002255 Brooks, D. R.; Mayes, M. A.; Thorson, T. B. /PARAVITELLOTREMA OVERSTREETI/ SP. N. (DIGENEA: HEMIURIDAE) FROM THE COLOMBIAN FRESHWATER STINGRAY /POTAMOTRYGON MAGDALENAE/ DUMERIL. Proc. Helminthol. Soc. Wash. 46 (1): 52-54. Jan. 1979. SFA 24(3)
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[Dep. Biol., Tenn. Technol. Univ., Cookeville 38501]

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[Bundesforschungsanstalt Fisch., Hamburg, West Germany]

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79-002260 Dojiri, M. TWO NEW SPECIES OF /LEPEOPHTEIRUS/ (COPEPODA: CALIGIDAE) PARASITIC ON FISHES FROM SOUTHERN CALIFORNIA WATERS. Parasitology 78 (3): 251-262. June 1979. SFA 24(3)
[Mar. Biol. Lab., Woods Hole, MA 02543]

79-002261 Duru, C.; Johnson, A. D. /NEASCUS PYRIFORMIS/, THE BLACK-SPOT TREMATODE OF FISHES IN BRULE CREEK, SOUTH DAKOTA. Proc. N.D. Acad. Sci. 33: 83. Apr. 1979. Abstract only. SFA 24(3)
[Biol. Dep., Univ. S. Dak., Vermillion 57069]

79-002262 Eisen, S. ECOLOGY OF LERNAEA CYPRINACEA. Ph.D. dissertation, Indiana Univ. 120p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(9):4172. Mar. 1979. SFA 24(3)

79-002263 Heckmann, R. A.; Palmieri, J. F. THE EYE FLUKE DISEASE (DIPLOSTOMATOSIS) IN FISHES FROM UTAH. Great Basin Nat. 38 (4): 473-477. 31 Dec. 1978. SFA 24(3)
[Dep. Zool., Brigham Young Univ., Provo, UT 84602] During 1976 and 1977, 798 fish representing 11 species from eight collection sites in Utah were examined for metacercariae of /Diplostomum spathaceum/, which causes the fish eye fluke disease, diplostomatosis. Eight species were infected. The infection rate ranged from 7 percent of 46 /Salmo gairdneri/ from Soldiers Creek Reservoir to 100 percent in 7 species of fish from four collection sites. Summary charts for four years of data are given for collection sites, piscine hosts in Utah, and fish hosts for Strawberry Reservoir, Utah.

79-002264 Hewitt, G. C. /ABERGASILUS AMBLEXUS/ GEN. ET SP. NOV. (ERGASILIDAE; PARASITIC COPEPODA) FROM FISHES IN LAKE ELLESMERE, NEW ZEALAND. N.Z. J. Mar. Freshwater Res. 12 (2): 173-177. June 1978. SFA 24(3)
[Zool. Dep., Victoria Univ. Wellington, Private Bag, Wellington, New Zealand]

79-002265 Imada, R.; Muroga, K. [/PSEUDODACTYLOGYRUS MICRORCHIS/ (MONOGENEA) ON THE GILLS OF CULTURED EELS--III. EXPERIMENTAL CONTROL BY TRICHLORFON.] Bull. Jpn. Soc. Sci. Fish. 45 (1): 25-29. Jan. 1979. In Japanese with English summ. SFA 24(3)
[Fukui Pref. Fish. Exp. Stn., Turuga, Japan]

79-002266 Muzzall, P. M. STUDIES ON THE POPULATION BIOLOGY, HOST-PARASITE RELATIONSHIPS, AND COMMUNITY DIVERSITY OF SEVERAL ENDOHELMINTHS INFECTING THE WHITE SUCKER, /CATOSTOMUS COMMERSONI/ (LACEPEDE), FROM THE BELLAMY AND OYSTER RIVERS, NEW HAMPSHIRE. Ph.D. dissertation, Univ. N.H. 179p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5277. May 1979. SFA 24(3)

79-002267 Nebeker, A. V.; Hauck, A. K.; Baker, F. d. TEMPERATURE AND OXYGEN-NITROGEN GAS RATIOS AFFECT FISH SURVIVAL IN AIR-SUPERSATURATED WATER. Water Res. 13 (3): 299-303. 1979. SFA 24(3)
[U.S. EPA, 1350 S.E. Goodnight Ave., Corvallis, OR 97330] Juvenile steelhead trout and juvenile chinook, coho and sockeye salmon were tested at different temperatures (8°, 9°, 10°, 12°, 15°, 18° and 20°C) at the same concentration of air-supersaturated water. Supersaturated water concentrations in different tests were 115, 116, 117, 118 and 120 percent saturation. Increased temperatures caused a significant (P is less than 0.005) increase in steelhead mortality, a significant increase (P is less than 0.025) in chinook deaths, but no significant effect on coho or sockeye mortality. Regression model data for steelhead indicate that a 10°C increase in temperature will decrease the time to 50 percent death by a factor of 2.7, e.g. from 190 h at 8°C to 70 h at 18°C, when tested at the same total dissolved gas pressure. Effects of different oxygen-nitrogen gas ratios on fish mortality at the same total dissolved gas pressure in supersaturated water were demonstrated with juvenile steelhead trout. Mortality was rapid (time to 50 percent death in 1-6h) at 140, 135 and 130 percent saturation, with fish dying more rapidly as the ratio of oxygen-nitrogen decreased (decrease in O(2), increase in N(2)). Mortality patterns were similar at 125 percent; time to 50 percent death occurred in 5-20 h, with more rapid deaths occurring as oxygen (O(2)/N(2) ratio) was decreased.

79-002268 Pal, R. N. TREATMENT OF TUMOURS IN /ANAEAS TESTUDINEUS/ (BLOCH). J. Inland Fish. Soc. India 8: 105-106. Dec. 1976. SFA 24(3)

79-002269 Shaw, M. K. THE ULTRASTRUCTURE OF THE CLAMP WALL OF THE MONOGENEAN GILL PARASITE /GASTROCOTYLE TRACHURI/. Z. Parasitenkd. 58 (3): 243-258. 1979. SFA 24(3)
[Dep. Biochem., Univ. Manchester Inst. Sci. Technol., Manchester M60 1QD, England]

79-002270 Sjoblom, V.; Kuittinen, E. FURTHER FINDS OF /PHOCASCARIS/ SP. (NEMATODA) IN BALTIC HERRING OFF THE COAST OF FINLAND. Int. Counc. Explor. Sea. C.M. 1978/J:19. 7p. 1978. In English with French summ. SFA 24(3)
[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland] The search for /Anisakis/ on the coast of Finland was continued in 1976 by inspection of 3,400 Baltic herring after treatment with citric acid-pepsin. As in the previous year, no /Anisakis/ larvae were found. However, the search revealed 20 larvae of /Phocascaris/ sp., first recorded in the Baltic in 1975. The

79-002270 CONTINUED
occurrence of /Anisakis/ in the Baltic is discussed.

79-002271 van den Broek, W. L. F. COPEPOD ECTOPARASITES OF /MERLANGIUS MERLANGUS/ AND /PLATICHTHYS FLESUS/. J. Fish Biol. 14 (4): 371-380. Apr. 1979. SFA 24(3)
[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19062, Wellington, New Zealand]

79-002272 van den Broek, W. L. F. INFECTION OF ESTUARINE FISH POPULATIONS BY /CRYPTOCOTYLE LINGUA/ (CREPLIN). J. Fish Biol. 14 (4): 395-402. Apr. 1979. SFA 24(3)
[Fish. Res. Div., P.O. Box 19062, Wellington, New Zealand]

79-002273 Williams, D. D. /DISSORCHIS HYPENTELII/ (TREMATODA: DISSORCHIIDAE) FROM RED CEDAR RIVER, WISCONSIN, CATOSTOMID FISHES. Proc. Helminthol. Soc. Wash. 46 (1): 150-151. Jan. 1979. SFA 24(3)
[1924 19th Ave., Bloomer, WI 54724]

79-002274 Williams, D. D. SEASONAL INCIDENCE OF /ISOGLARIDACRIS WISCONSINENSIS/ (CESTODA: CARYOPHYLLAEIDAE) IN ITS FISH HOST. Iowa State J. Res. 53 (4): 305-310. May 1979. SFA 24(3)
[1924 19th Ave., Bloomer, WI 54724] The seasonal incidence of /Isoglaridacris wisconsinensis/ Williams, 1977 in its fish host, /Hypentelium nigricans/, was studied from June 1977 to August 1978. Increases in incidence and population occurred in spring and autumn and decreases occurred in February and July. Gravid cestodes were present in all months. Maturation of the cestode is also discussed. Specimens of four other caryophyllaeid species were also obtained.

79-002275 Williams, E. H., Jr. /PENARCHIGETES FESSUS/ SP. N. FROM THE LAKE CHUBSUCKER, /ERIMYZON SUCETTA/ (LACEPEDE) IN THE SOUTHEASTERN UNITED STATES. Proc. Helminthol. Soc. Wash. 46 (1): 84-87. Jan. 1979. SFA 24(3)
[Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez 00708]

79-002276 Williams, E. H., Jr.; Williams, L. B. CYMOTHOID ISOPODS OF SOME MARINE FISHES FROM THE NORTHERN GULF OF MEXICO. Northeast Gulf Sci. 2 (2): 122-124. Dec. 1978. SFA 24(3)
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79-002277 Wooten, R.; Smith, J. W. THE OCCURRENCE OF PLEROCERCOIDS OF /DIPHYLLOBOTHRIUM/ SPP. IN WILD AND CULTURED SALMONIDS FROM THE LOCH AWE AREA. Scott. Fish. Res. Rep. no. 13. 8p. 1979. SFA 24(3)
[Mar. Lab., Aberdeen, Scotland]

79-002278 Yamazaki, F.; Hitino, T.; Nakamura, H. [STUDIES ON EPIDERMAL PAPILLOMAS OF THE GOBY, /ACANTHOGOBIUS FLAVIMANUS/ INHABITING HAKODATE BAY.] Bull. Fac. Fish. Hokkaido Univ. 29 (4): 338-348. Nov. 1978. In Japanese with English summ. SFA 24(3)
[Lab. Embryol. Genet., Fac. fish., Hokkaido Univ., Hakodate 041, Japan]

POLLUTION

79-002279 Arway, J.; Forak, W. F.; Morgan, E. L. SODIUM HYDROXIDE NEUTRALIZATION OF ACID RECEIVING STREAMS IN THE CHEROKEE NATIONAL FOREST. J. Tenn. Acad. Sci. 54 (2): 71-72. Apr. 1979. Abstract only. SFA 24(3)
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[Ohio Environ. Prot. Agency, 1035 Devlac Grove Dr., Bowling Green 43402]

79-002281 DeGraeve, G. M.; Bergman, H. L. AQUATIC EFFECTS OF EFFLUENTS PRODUCED FROM /IN SITU/ RECOVERY OF SHALE OIL AND COAL. J. Colo.-Wyo. Acad. Sci. 11 (1): 13-14. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Wyo., Laramie]

79-002282 Elzorgani, G. A.; Abdulla, A. M.; Ali, M. E. T. RESIDUES OF ORGANOCHLORINE INSECTICIDES IN FISHES IN LAKE NUBIA. Bull. Environ. Contam. Toxicol. 22 (1-2): 44-48. May 1979. SFA 24(3)
[Agric. Res. Corp., Wad Medani, Sudan]

79-002283 Greer, G. L.; Kosakoski, G. J. AVOIDANCE OF SEAWATER DILUTIONS OF KRAFT PULP MILL EFFLUENT BY SEAWATER ACCLIMATED PINK SALMON FRY. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 831. iii + 11p. Nov. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]
Seawater acclimated pink salmon fry (/Oncorhynchus gorbuscha/), age 2-4 months, were used to measure avoidance of bleached kraft pulp mill effluent (BKME) diluted in sea water. BKME with a 96 h LC50 of 75-80 percent full strength was avoided at concentrations ranging from 0.8-15.5 percent full strength effluent but the avoidance was largely a response to lower salinity of the test water caused by addition of non-saline BKME. A change in behavioural strategy when avoiding seawater dilutions of BKME compared to avoidance of similar dilutions of fresh water in sea water indicated BKME produced some additional effect on the response to lower salinities.

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[Univ. Tex., Austin]

79-002286 Harding, G. C. H.; Vass, W. P. UPTAKE FROM SEAWATER AND CLEARANCE OF /P,P'/-DDT BY MARINE PLANKTONIC CRUSTACEA. J. Fish Res. Board Can. 36 (3): 247-254. Mar. 1979. In English with French summ. SFA 24(3)
[Bedford Inst. Oceanogr., Darmouth, NS B2Y 4A2, Canada]

79-002287 Hashemy-Tonkabony, S. E.; Gharibzadeh, M. DETECTION AND DETERMINATION OF CHLORINATED PESTICIDE RESIDUES IN FISH FROM TEHRAN RESERVOIRS. Environ. Res. 18 (2): 276-280. Apr. 1979. SFA 24(3)
[Res. Lab., Dep. Food Hygiene, Univ. Tehran, P.O. Box 3262, Tehran, Iran]

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79-002289 Jorgensen, S. E. MODELLING THE DISTRIBUTION AND EFFECT OF HEAVY METALS IN AN AQUATIC ECOSYSTEM. Ecol. Model. 6 (3): 199-222. Mar. 1979. SFA 24(3)
[R. Danish Sch. Pharm., Dep. Chem. AD, 2 Universitetsparken, DK-2100 Copenhagen, Denmark]

79-002290 Kalmaz, E. V.; Kalmaz, G. D. TRANSPORT, DISTRIBUTION AND TOXIC EFFECTS OF POLYCHLORINATED BIPHENYLS IN ECOSYSTEMS: REVIEW. Ecol. Model. 6 (3): 223-251. Mar. 1979. SFA 24(3)
[Univ. Tenn., Memorial Res. Cent., Knoxville 37920]

79-002291 Keck, G.; Raffenot, J. CHEMICAL CONTAMINATION BY PCBS IN THE FISHES OF A FRENCH RIVER: THE FURANS (JURA). Bull. Environ. Contam. Toxicol. 21 (4/5): 689-696. Mar. 1979. SFA 24(3)
[Lab. Toxicol., Natl. Vet. Sch. Lyon, Route de Sain-Bel, Marcy L'Etoile, 69260 Charbonnieres les Bains, France]

79-002292 Liden, L. H.; Burton, D. T. RESPONSES OF SELECTED CHESAPEAKE BAY FISH AND INVERTEBRATE SPECIES TO NATURAL AND ARTIFICIAL THERMAL INCREASES--A REVIEW OF THE LITERATURE. U.S. Dep. Commer. Natl. Tech. Inf. Serv. PB-290 596. ii + 58p. 1978. SFA 24(3)
[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 20612]

79-002293 Martin, G. L. THE EFFECT OF THE GREENWICH SEWAGE LAGOON DISCHARGE UPON TWO SMALL RECEIVING STREAMS IN NORTHWEST OHIO. Ohio J. Sci. 79: 95. Apr. 1979. Abstract only. SFA 24(3)
[Ohio Environ. Prot. Agency, 1035 Devlac Grove Dr., Bowling Green 43402]

79-002294 Matter, W. J. THE STATUS AND SEASONAL DYNAMICS OF FISH AND BENTHIC INVERTEBRATE POPULATIONS IN RELATION TO ORGANIC AND INORGANIC MATERIAL INPUTS AND SURFACE MINING IMPACTS IN THREE VIRGINIA HEADWATER STREAMS. Ph.D. dissertation, Va. Polytech. Inst. State Univ. 173p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11):5163. May 1979. SFA 24(3)

Study of two streams impacted by surface-mining and a similar unimpacted reference stream demonstrated that alkalinity, conductivity, hardness, and sulfate were elevated in the former despite reclamation treatment of the watersheds three to five years earlier. The mined-watersheds carried a heavy benthic sediment burden, due primarily to the continued erosion from the mined areas and from abandoned haul roads. Inorganic sediment in the mining-impacted streams covered the natural rubble substrate, smoothing the bottom, filling in pools, and impacting the processing of allochthonous organic material, the principal energy source. Fine-particle organic material was trapped in the sediment, but density of larger particles was reduced, possibly due to increased transport over the smoothed substrate. Benthic invertebrate and fish density, biomass, and diversity were consistently lower in the mining-impacted streams. This study demonstrates that sedimentation can be a severe and long-term after-effect of surface mining, even in the absence of acid drainage. Terrestrial reclamation did not result in lotic reclamation and recovery. The inclusion of water quality criteria in the administration of mined-land reclamation would promote terrestrial management practices conducive to aquatic systems recovery.--From abstr.

79-002295 Middleditch, B. S.; Chang, E. S.; Basile, B.; Missler, S. R. ALKANES IN FISH FROM THE BUCCANEER OILFIELD. Bull. Environ. Contam. Toxicol. 22 (1-2): 249-257. May 1979. SFA 24(3)
[Dep. Biophys. Sci., Univ. Houston, Houston, TX 77004]

79-002296 Phillips, J. W. THE EMBRYOLOGICAL EFFECTS OF ELEVATED THERMAL TIME-EXCESS HISTORIES ON THE AMERICAN SHAD, /ALOSA SAPIDISSIMA/ (WILSON). Ph.D. dissertation, Univ. Mass. 131p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(8):3738. Feb. 1979. SFA 24(3)

79-002297 Pistono, R. SILTATION--THE SILENT HABITAT DESTROYER. Wyo. Wildl. 43 (4): 26-29. Apr. 1979. SFA 24(3)
[Wyo. Game Fish Dep., Lander]

79-002298 Saigal, B. N.; Ghosh, A.; Datta, A. K.; Chakraborti, P. K. OBSERVATIONS ON THE EFFECT OF TOXIC FACTORS LIBERATED DURING JUTE RETTING ON SOME FISHES. Indian J. Environ. Health 17 (4): 318-322. 1975. SFA 24(3)

79-002299 Satsmadjis, J.; Gabrielides, G. P. OBSERVATIONS ON THE CONCENTRATION LEVELS OF CHLORINATED HYDROCARBONS IN A MEDITERRANEAN FISH. Mar. Pollut. Bull. 10 (4): 109-111. Apr. 1979. SFA 24(3)
[Inst. Oceanogr. Fish. Res., Athens, Greece]

79-002300 Scharf, P. W. A FISH TEST ALARM DEVICE FOR THE CONTINUAL RECORDING OF ACUTE TOXIC SUBSTANCES IN WATER. Arch. Hydrobiol. 85 (2): 250-256. 1979. In English with German summ. SFA 24(3)
[Landesamt Gewasserkd., Am Zollhafen 9, D-6500 Mainz 1, West Germany] The fish test alarm device described here serves to measure high concentrations of poisons in sewage station inlets, for example. This test utilizes the positive rheotaxis of fish. This model has several advantages compared to existing fish warning test devices.

79-002301 Scullion, J.; Edwards, R. W. THE MOVEMENT OF HATCHERY-REARED RAINBOW AND BROWN TROUT IN A POLLUTED RIVER IN THE SOUTH WALES COALFIELD. J. Fish Biol. 14 (2): 173-178. Feb. 1979. SFA 24(3)
[Dep. Appl. Biol., Univ. Wales, Inst. Sci. Technol., Cardiff, Wales] Hatchery reared rainbow and brown trout (length 20 cm) were released in March 1974 and April 1975 respectively into the Taff Bargoed, a small river in South Wales, polluted by coal wastes and containing a low resident population of brown trout. From subsequent electrofishing surveys and catch returns from anglers, extensive downstream movements occurred in both species. About 50 percent had either been caught or had moved out of the river, a distance of about 5 km, after two weeks and after two months only some 10 percent remained. Within the fishing season it was estimated that 3 and 22 percent of brown and rainbow trout respectively were caught.

79-002302 Sigmon, C. F. EFFECTS OF THERMAL LOADING ON BOTTOM INVERTEBRATES IN A SOUTH CAROLINA RESERVOIR. Clemson Univ. Water Resour. Res. Unit Rep. No. 76. Apr. 1979. SFA 24(3)
[Zool. Dep., Clemson Univ., Clemson, SC 29631]

79-002303 Vidal, I. L. COPPER IN THE LIVERS OF TROUT CAUGHT BELOW A SEWAGE DISCHARGE. N.Z. J. Mar. Freshwater Res. 12 (2): 217-219. June 1978. SFA 24(3)
[Works Dep. Lab., Wellington City Corp., P.O. Box 2199, Wellington, New Zealand] The range of copper concentrations in the livers of 21 brown trout /Salmo trutta/ I. caught in a pool in the Wainuiomata River, Wellington, was 93-809 $ug \cdot g^{-1}$ by weight of wet tissue. This pool was 150 m below a sewage-treatment plant discharging into the river. The mean copper concentration in the livers of 11 of these trout caught in November-December 1976 was 505 $ug \cdot g^{-1}$, and for the other 10 trout, caught in the same months in 1977, 312 $ug \cdot g^{-1}$. Bottom fauna in the pool was dominated by the snails /Physastra variabilis/ and /Potamopyrgus antipodum/, which were ingested by the trout. Copper concentrations for these snails in the pool and in upstream clean waters, the sewage and sewage solids, the silt and organic sediments of the pool, upstream clean water and the water of the pool, and mayflies and caddises which drift into the pool, are reported. Copper concentrations in the stomachs and intestines of 10 fish examined indicate that not all of the copper ingested is assimilated by the fish.

79-002304 Water Research Centre NEW EUROPEAN STANDARDS FOR FRESHWATER FISH. Notes on Water Res. no. 20. 4p. 1979. SFA 24(3)

79-002305 Yoder, C. THE VALUE AND USE OF FISH AS INDICATORS OF WATER QUALITY. Ohio J. Sci. 79: 99. Apr. 1979. Abstract only. SFA 24(3)
[Ohio Environ. Prot. Agency, 361 E. Broad St., Columbus 43215] Biological monitoring is gaining importance in the assessment of water quality in the surface waters of the United States. Time, manpower, and resource constraints usually limit pollution control agencies to consider one or two aquatic organism groups. The suitability of fish as indicators of water quality conditions is discussed. Some results of previous studies in several Ohio rivers and streams are used to illustrate methodologies for the collection, analysis, and use of fish community and population data. The composite index of community well-being [I(WB)] was used to show changes in community abundance and diversity while community composition based on relative density and biomass was used to show changes in species populations. Information derived from these and similarly conducted studies can be used to evaluate waste load allocation modeling studies and areawide water quality management programs. Probably the most important result of these efforts is the determination of where the Clean Water Act interim goal of fishable waters is or is not being achieved.

79-002306 Young, D. R.; Heesen, T. C.; Esra, G. N.; Howard, E. E. DDE-CONTAMINATED FISH OFF LOS ANGELES ARE SUSPECTED CAUSE IN DEATHS OF CAPTIVE MARINE BIRDS. Bull. Environ. Contam. Toxicol. 21 (4/5): 584-590. Mar. 1979. SFA 24(3)
[South. Calif. Coast. Water Res. Proj., 1500 E. Imperial Hwy., El Segundo 90245]

FISH KILLS

79-002307 Gilmore, R. G.; Bullock, L. H.; Berry, F. H. EYPOTHERMAL MORTALITY IN MARINE FISHES OF SOUTH-CENTRAL FLORIDA JANUARY, 1977. Northeast Gulf Sci. 2 (2): 77-97. Dec. 1978. SFA 24(3)
[Harbor Branch Found., Inc., RR 1, Box 196, Fort Pierce, FL 33450] Comparable climatic conditions on both coasts of central Florida resulted in cold induced fish mortalities from 19 January to 13 February 1977. Lethal temperatures, the species killed and their relative numbers killed are compared for the Indian River lagoon, Tampa Bay and Sanibel Island estuarine systems. Fifty-six species were killed in the Indian River area, 36 in the Tampa Bay area, while 19 died at Sanibel Island. The higher species mortality in the Indian River lagoon may be attributed to local hydrological and topographical conditions and a richer ichthyofauna. Cold-induced mortality was noted in both juvenile and adult tropical fishes. Some tropical species appear to be more eurythermic than others as lethal minimum temperatures ranged from 6 to 13 C. Hypothermal stress and mortality were observed in offshore reef fishes.

TOXICOLOGY; BIOASSAYS

79-002308 Addison, R. F.; Law, F. C. P. INDUCTION OF HEPATIC MFO ENZYMES IN TROUT FED PCB, SOME PROPOSED PCB REPLACEMENTS, AND RELATED COMPOUNDS. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A182. 30 Mar. 1979. Abstract only. SFA 24(3)
[Mar. Ecol. Lab., P.O. Box 1006, Dartmouth, NS, Canada]

79-002309 Ahrens, V. D.; Maylin, G. A.; Henion, J. D.; St. John, L. E., Jr.; Lisk, D. J. FABRIC RELEASE, FISH TOXICITY AND WATER STABILITY OF THE FLAME RETARDANT, FYROL FR-2. Bull. Environ. Contam. Toxicol. 21 (3): 409-412. Feb. 1979. SFA 24(3)
[Coll. Home Econ., Univ. Del., Newark 19711]

79-002310 Blahm, T. H. TOXICITY OF CHEMICAL FIRE RETARDANTS TO JUVENILE COHO SALMON AND RAINBOW TROUT. Ph.D. dissertation, Univ. Idaho 48p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(9):4115. Mar. 1979. SFA 24(3)
Continuous flow bioassay tests demonstrated that commercial fire retardants were toxic to juvenile coho salmon, /Oncorhynchus kisutch/, and rainbow trout, /Salmo gairdneri/. Ammonia present in the retardants caused the mortality. Statistical analysis indicated that increasing the diluent water pH from 7 to 8 increased the toxicity of the retardant to salmon and trout. The lethal concentrations that caused 50 percent mortality, in 96 hours with rainbow trout, (LC(50)) for Phos-Chek XA were 224 at pH 7 and 139 at pH 8. The LC(50)'s for Fire-Trol 931 were 1,238 ppm at pH 7 and 150 ppm at pH 8. An increase in test water temperature, from 10 to 20°C, did not cause statistically significant differences in toxic effect of the retardants.

79-002311 Blaylock, B. G.; Frank, M. L. A COMPARISON OF THE TOXICITY OF NICKEL TO THE DEVELOPING EGGS AND LARVAE OF CARP (/CYPRINUS CARPIO/). Bull. Environ. Contam. Toxicol. 21 (4/5): 604-611. Mar. 1979. SFA 24(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

79-002312 Broderius, S. J.; Smith, L. L., Jr. LETHAL AND SUBLETHAL EFFECTS OF BINARY MIXTURES OF CYANIDE AND HEXAVALENT CHROMIUM, ZINC, OR AMMONIA TO THE FATHEAD MINNOW (/PIMEPHALES PROMELAS/) AND RAINBOW TROUT (/SALMO GAIRDNERI/). J. Fish. Res. Board Can. 36 (2): 164-172. Feb. 1979. In English with French summ. SFA 24(3)
[U.S. EPA, Environ. Res. Lab., Duluth, MN 55804]

79-002313 Buikema, A. L., Jr.; Benfield, E. F. USE OF MACROINVERTEBRATE LIFE HISTORY INFORMATION IN TOXICITY TESTS. J. Fish. Res. Board Can. 36 (3): 321-328. Mar. 1979. In English with French summ. SFA 24(3)
[Cent. Environ. Stud., VPI&SU, Blacksburg, VA 24061]

79-002314 Carrick, T. R. THE EFFECT OF ACID WATER ON THE HATCHING OF SALMONID EGGS. J. Fish Biol. 14 (2): 165-172. Feb. 1979. SFA 24(3)

[Freshwater Biol. Assoc., The Ferry House, Far Sawrey, Ambleside, Cumbria, England] The survival of salmon /Salmo salar/, sea trout and brown trout /Salmo trutta/ eggs in acid water in the range of pH 3.5-7.0 was investigated over a period of three winters. The effects of fertilising the eggs in acid water at pH 4.0, 4.5 and 5.0, and dilution of the test media were also studied. There was considerable yearly variation in the numbers of eggs which hatched, but there were no marked differences between the three species in the tolerances of the eggs to acid water; pH 3.5 was lethal within 10 days to all the eggs, but at pH 4.5 and higher pH levels there was no obvious difference in hatching attributable to acidity.

79-002315 Chaudhuri, H. EXPERIMENTS ON THE EFFECTS OF ORGANOCHLOR INSECTICIDES ALDRIN, DIELDRIN AND ENDRIN ON FISH AND OTHER POND ORGANISMS. J. Inland Fish. Soc. India 7: 189-203. Dec. 1975. SFA 24(3)

Complete kills of miscellaneous fishes, prawns and insects (backswimmers) were obtained in the laboratory at a concentration of 0.3, 0.01 and 0.001 ppm of aldrin, dieldrin and endrin respectively. Zooplankters were not affected at any of these doses. A few zooplankters were found alive even at 0.5 ppm of endrin. In the field-conditions, endrin killed all fishes and common pond organisms at 0.01 ppm excepting molluscs and zooplankters. It could be used economically in cleaning ponds of miscellaneous fishes and other unwanted organisms but its regular use is not recommended because of the prolonged high toxicity, probably harmful cumulative effect on pond productivity and the risk involved in improper handling and use of the chemical.

79-002316 Chernoff, B.; Dooley, J. K. HEAVY METALS IN RELATION TO THE BIOLOGY OF THE MUMMICHOG, /FUNDULUS HETEROCLITUS/. J. Fish Biol. 14 (3): 309-328. Mar. 1979. SFA 24(3)

[J. K. Dooley: Dep. Biol., Adelphi Univ., Garden City, NY 11530] Heavy metal levels of cadmium, copper, mercury, manganese, and zinc were examined in the mummichog, /Fundulus heteroclitus/ from industrialized and non-industrialized environments. With one exception, the environment with the highest trace metal in its waters, had the fishes with the highest metal concentration. Except for mercury, the concentration factor varied inversely with the metal concentrations of the fish and water, suggesting a possible regulatory mechanism for metals in the tissues of mummichogs from environments with high metal concentrations. There was an inverse relationship between standard length and concentrations of zinc, manganese, copper and cadmium in whole male and female fishes. The viscera contained significantly greater concentrations of these metals than somatic muscle tissue. There were also significant differences between males and females with respect to whole-body zinc and copper concentrations, but no sex differences for manganese and cadmium.

79-002317 Darrow, D. C.; Addison, R. F. UPTAKE, TISSUE DISTRIBUTION, METABOLISM AND ELIMINATION OF N-OCTANE-1-^{14}C-HYDROXAMIC ACID BY BROOK TROUT. Bull. Environ. Contam. Toxicol. 22 (1-2): 265-270. May 1979. SFA 24(3)

[Fish. Mar. Serv., Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada] Brook trout rapidly accumulated and cleared a labelled medium chain length alkylhydroxamic acid. Appreciable amounts of accumulated material were evidently converted to the corresponding carboxylic acid (whence they entered the normal metabolism of the

79-002317 CONTINUED
animal via the lipoclastic cycle). The detoxification process (hydroxamate goes to carboxylate) evidently does not proceed sufficiently rapidly to offer complete protection to the fish, however, as in previous studies, OHA proved lethal to salmon fry.-- From results and discuss.

79-002318 Davis, J. C.; Shand, I. G. ACUTE AND SUBLETHAL COPPER SENSITIVITY, GROWTH AND SALTWATER SURVIVAL IN YOUNG BABINE LAKE SOCKEYE SALMON. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 847. v + 55p. Dec. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Environ. Inst., West Vancouver, BC V7V 1N6, Canada]

79-002319 Dawson, V. K.; Gilderhus, P. A. ETHYL-P-AMINOBENZOATE (BENZOCAINE): EFFICACY AS AN ANESTHETIC FOR FIVE SPECIES OF FRESHWATER FISH. U.S. Fish Wildl. Serv. Invest. Fish Control 87. 5p. 1979. SFA 24(3)
[U.S. FWS, Natl. Fish. Res. Lab. LaCrosse, WI 54601] Ethyl-p-aminobenzoate (benzocaine) was tested for its efficacy as an anesthetic for rainbow trout (/Salmo gairdneri/), brown trout (/Salmo trutta/), northern pike (/Esox lucius/), carp (/Cyprinus carpio/), and largemouth bass (/Micropterus salmoides/). Since benzocaine is not water soluble, it was applied with acetone as a carrier. Concentrations of 100 to 200 mg/l were required for large adult northern pike, compared with 50 to 100 mg/l for small fish. Rates of sedation and recovery were slower in cold water than in warm water. Water hardness had little influence on the activity of benzocaine. Fish were anesthetized faster and recovered more slowly in acid than in alkaline water. Benzocaine produced deep anesthesia, but concentrations that rendered the fish handleable within 5 min were generally not safe for exposures longer than 15 min. Concentrations of benzocaine efficacious for fish were not acutely toxic to eggs of coho salmon (/Oncorhynchus kisutch/), chinook salmon (/Oncorhynchus tshawytscha/), rainbow trout, brown trout, or lake trout (/Salvelinus namaycush/). Benzocaine is not registered for fishery use and is neither more effective nor safer than the registered anesthetic, tricaine methanesulfonate (MS-222).

79-002320 Dokholyan, V. K.; Akhmedova, T. P. THE EFFECT OF MERCURIC CHLORIDE ON SOME BIOCHEMICAL INDICATORS OF THE BRAIN, BLOOD AND LIVER OF THE "CASPIAN ROACH", /RUTILUS RUTILUS CASPICUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 162-165. 1978. SFA 24(3)
[Caspian Fish. Res. Inst., Makhachkala, USSR]

79-002321 Elcombe, C. R.; Franklin, R. B.; Iech, J. J. MONOOXYGENASE ACTIVITY IN RAINBOW TROUT. EFFECTS OF SELECTED PCB ISOMERS. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A171. 30 Mar. 1979. SFA 24(3)
[Dep. Pharmacol., Med. Coll. Wis., Milwaukee]

79-002322 Finlayson, B. J.; Ashuckian, S. H. SAFE ZINC AND COPPER LEVELS FROM THE SPRING CREEK DRAINAGE FOR STEELHEAD TROUT IN THE UPPER SACRAMENTO RIVER, CALIFORNIA. Calif. Fish Game 65 (2): 80-99. Apr. 1979. SFA 24(3)
[Calif. Dep. Fish Game, Water Pollut. Control Lab., 2005 Nimbus Rd., Rancho Cordova 95670]

79-002323 Folmar, L. C.; Sanders, H. O.; Julin, A. M. TOXICITY OF THE HERBICIDE GLYPHOSATE AND SEVERAL OF ITS FORMULATIONS TO FISH AND AQUATIC INVERTEBRATES. Arch. Environ. Contam. Toxicol. 8 (3): 269-278. 1979. SFA 24(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

79-002324 Freeman, H. C.; Uthe, J. F.; Fleming, R. E.; Cdense, P. H; Ackman, R. G.; Landry, G.; Musial, C. CLEARANCE OF ARSENIC INGESTED BY MAN FROM ARSENIC CONTAMINATED FISH. Bull. Environ. Contam. Toxicol. 22 (1-2): 224-229. May 1979. SFA 24(3)
[Fish. Mar. Serv., 1707 Lower Water St., P.O. Box 550, Halifax, NS B3J 2S7, Canada]

79-002325 Glickman, A. H.; Shono, T.; Casida, J. E.; Tech, J. J. STUDIES ON THE METABOLISM OF PERMETHRIN BY FISH. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A193. 30 Mar. 1979. Abstract only. SFA 24(3)
[Dep. Pharmacol., Med. Coll. Wis., Milwaukee]

79-002326 Guiney, P. D.; Melancon, M. J., Jr.; Tech, J. J.; Peterson, R. E. EFFECTS OF EGG AND SPERM MATURATION AND SPAWNING ON THE DISTRIBUTION AND ELIMINATION OF A POLYCHLORINATED BIPHENYL IN RAINBOW TROUT (/SALMO GAIRDNERI/). Toxicol. Appl. Pharmacol. 47 (2): 261-272. Feb. 1979. SFA 24(3)
[R. E. Peterson: Dep. Pharmacol., Med. Coll. Wis., Milwaukee 53226]

79-002327 Guiney, P. D.; Dickins, M.; Peterson, R. E. EFFECT OF COBALTOUS CHLORIDE TREATMENT ON 2-METHLYNAPHTHALENE DISPOSITION AND HEPATIC CYTOCHROME P-450 CONTENT IN CARP. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A170. 30 Mar. 1979. Abstract only. SFA 24(3)
[Univ. Wis., Madison]

79-002328 Heisinger, J. F.; Hansen, C. D.; Kim, J. H. EFFECT OF SELENIUM DIOXIDE ON THE ACCUMULATION AND ACUTE TOXICITY OF MERCURIC CHLORIDE IN GOLDFISH. Arch. Environ. Contam. Toxicol. 8 (3): 279-283. 1979. SFA 24(3)
[Biol. Dep., Univ. S. Dak., Vermillion 57069] Acute toxicity tests showed that selenium dioxide was a strong antagonist against mercuric chloride toxicity in goldfish. Paradoxically, whole body accumulations of total mercury were found to be significantly increased with the administration of Se. Maximum binding of Hg to fish was produced by approximately equimolar experimental concentrations of Hg and Se, but higher levels of Se reduced this binding. The greater the Hg accumulation the greater was the ability to survive a given environmental Hg concentration. Much of the Hg was in the skin and surface mucus on the gills and body; however, Se also increased Hg concentration in the inner tissues of the fish.

79-002329 Hinton, M. J.; Loyacano, H. A., Jr. EFFICACY OF QUINALDINE AND MS-222 ON AMERICAN EEL. Proc. Annu. Meeting World Maricult. Soc. 9: 647-652. 1978. SFA 24(3)
[Dep. Entomol. Econ. Zool., Clemson Univ., Clemson, SC 29631]

79-002330 Holcombe, G. W.; Benoit, D. A.; Leonard, E. N. LONG-TERM EFFECTS OF ZINC EXPOSURES ON BROOK TROUT (/SALVELINUS FONTINALIS/). Trans. Am. Fish. Soc. 108 (1): 76-87. Jan. 1979. SFA 24(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

79-002331 Iwama, G. K.; Greer, G. L. TOXICITY OF SODIUM PENTACHLOROPHENATE TO JUVENILE CHINOOK SALMON UNDER CONDITIONS OF HIGH LOADING DENSITY AND CONTINUOUS-FLOW EXPOSURE. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 846. iii + 7p. Nov. 1978. SFA 24(3)
[B.C. Dep. Fish Wildl., 400-1019 Wharf St., Victoria, BC, Canada] The 96 h LC50 of sodium pentachlorophenate (NaPCP) to juvenile chinook salmon, /Oncorhynchus tschawytscha/, determined in soft [54 mg/L = CaCO(3)], fresh water by continuous-flow bioassay and at a high loading density (13.8 g/L), was 0.078 mg/L NaPCP (95 percent confidence limits, 0.057 and 0.110 mg/L). This value of NaPCP toxicity for chinook is within the range of 96 h LC50's (0.032-0.130 mg/L) determined for three related species of juvenile salmonids by static bioassay and loading density of 0.5 g/L.

79-002332 Jarvinen, A. W.; Tyo, R. M. TOXICITY TO FATHEAD MINNOWS OF ENDRIN IN FOOD AND WATER. Arch. Environ. Contam. Toxicol. 7 (4): 409-421. 1978. SFA 24(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804] Fathead minnows (/Pimephales promelas/) were exposed during a partial chronic toxicity study to endrin concentrations in the water or food, or both, for 300 days encompassing reproduction. Tissue residues were analyzed at preset intervals for first-generation fish, and were also determined for embryos, larvae at hatch, and 30-day progeny. Gas-chromatographic and liquid-scintillation techniques were used to monitor the contribution of endrin from each source. The food was clams that had accumulated 14C-endrin when exposed to an endrin water concentration similar to that to which the fish were exposed. Higher endrin tissue residues were accumulated from the water than from food. Maximum concentration factors were 0.8 from the food and 13,000 from the water. Residues contributed by endrin in the food were additive to those from the water at all life stages. Endrin in the food (0.63 ppm) significantly reduced survival of the fathead minnows, and fish exposed to both endrin sources had lower survival than those exposed to either source alone. Endrin residues in embryos and larvae were highest and larval survival lowest for progeny of adults exposed to endrin in both food and water. Survival of 30-day progeny was significanly reduced at all test exposures (0.63 ppm in the food, water exposures of 0.14 and 0.25 ppb, and all combinations of food and water exposure).

79-002333 Jauch, D. GILL LESIONS IN CICHLID FISHES AFTER INTOXICATION WITH THE INSECTICIDE FENTHION. Experientia (Basel) 35 (3): 371-372. 15 Mar. 1979. SFA 24(3)
[Inst. Biol. III, Morgenstelle 28, D-7400 Tubingen, West Germany] The toxic effects of Fenthion on the gills of Cichlid fishes were investigated. In /Herotilapia multispinosa/ hyperplasia and separation of the respiratory epithelium, lamellar telangiectasis and thrombosis occurred. The lamellar epithelium of surviving fish regenerated in all cases. In /Tilapia leucosticta/ no telangiectasis was found, but all

79-002333 CONTINUED
the secondary lamellae were fused due to the severe hyperplasia of the gill epithelium.

79-002334 Judy, R. D., Jr.; Davies, P. H. EFFECTS OF CALCIUM ADDITION AS CA(NO(3))(2) ON ZINC TOXICITY TO FATHEAD MINNOWS, /PIMEPHALES PROMELAS/, RAFINESQUE. Bull. Environ. Contam. Toxicol. 22 (1-2): 88-94. May. 1979. SFA 24(3)
[Dep. Biol. Sci., North Tex. State Univ., Denton 76203] These experiments demonstrated conclusively that Ca^{++} in solution inhibits the toxicity of Zn^{++} to /P. promelas/. The physiological interactions of Ca^{++} and Zn^{++} have not been investigated, and long-term testing needs to be done on this problem. Water quality criteria for "safe" Zn^{++} levels are affected by the antagonistic influence of Ca^{++} to the toxicity of Zn^{++}.--From discuss.

79-002335 Kamiya, H.; Naka, K.; Hashimoto, K. ICHTHYOTOXICITY OF A FLAGELLATE /UROGLENA VOLVOX/. Bull. Jpn. Soc. Sci. Fish. 45 (1): 129. Jan. 1979. SFA 24(3)
[Lab. Mar. Biochem., Fac. Agric., Univ. Tokyo, Bunkyo-ku, Tokyo, Japan]

79-002336 Kanazawa, J.; Tomizawa, C. INTAKE AND EXCRETION OF 2,4,6-TRICHLOROPHENYL-4'-NITROPHENYL ETHER BY TOPMOUTH GUDGEON, /PSEUDORASBORA PARVA/. Arch. Environ. Contam. Toxicol. 7 (4): 397-407. 1978. SFA 24(3)
[Natl. Inst. Agric. Sci., 2-1-7, Nishigahara, Kita-ku, Tokyo, 114 Japan] When the freshwater fish, topmouth gudgeon, was exposed to continuous flow water containing 20 ppb of CNP (2,4,6-trichlorophenyl-4'-nitrophenyl ether), CNP concentration in the fish body gradually increased and reached equilibrium after seven days. CNP concentration and bioconcentration ratio (partition coefficient between fish body and water) after 15 days were 25.3 ppm and 1109, respectively. When the fish was transferred into clean water, the CNP taken into the fish body was slowly excreted and decreased to 0.115 ppm after 30 days. In order to examine distribution and metabolism of CNP in the fish body, an exposure test to static water containing 20 and 100 ppb of ^{14}C-labeled CNP was conducted. The concentration of ^{14}C-CNP equivalent after seven days was decreased in the following order: kidney, viscera except kidney and liver, liver, head, muscle. More than 90 percent of the toluene-soluble fraction of the ^{14}C in each organ was the parent compound (CNP), and no significant decrease in the concentration of ^{14}C-CNP equivalent in each organ of the fish was found seven days after transfer into clean water. Consequently it appears that CNP is fairly persistent in the fish body. Several metabolites in the toluene-soluble fraction of fish and water were detected by TLC. Among these metabolites, only amino-CNP and p-nitrophenol were identified by GLC.

79-002337 Kenaga, E. E. ACUTE AND CHRONIC TOXICITY OF 75 PESTICIDES TO VARIOUS ANIMAL SPECIES. Down to Earth 35 (2): 25-31. 1979. SFA 24(3)
[Dow Chemical Co., Midland, MI]

79-002338 Klaassen, H. E.; Kadoum, A. M. DISTRIBUTION AND RETENTION OF ATRAZINE AND CARBOFURAN IN FARM POND ECOSYSTEMS. Arch. Environ. Contam. Toxicol. 8 (3): 345-353. 1979. SFA 24(3)
[Dep. Biol., Kansas State Univ., Manhattan 66506] The distribution and retention of atrazine and carbofuran in farm ponds were examined after application of 0.3 ppm of atrazine [2-chloro-4-(ethylamino)-6-(isopropylamino)-S- triazine] for two years and 0.025 ppm of carbofuran (2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate) the first year and 0.050 ppm for the second year. Samples of water, mud, and various biological components for the systems were collected periodically for residue analyses by gas chromatography. Soon after atrazine was applied, it was found in all physical and biological components. No biological magnification was observed. Carbofuran showed up only in the water and mud immediately after application; from then on it was absent from all components. No adverse effects from either pesticide were observed in the biological components.

79-002339 Klaunig, J. E.; Lipsky, M. M.; Trump, B. F.; Hinton, D. E. BIOCHEMICAL AND ULTRASTRUCTURAL CHANGES IN TELEOST LIVER FOLLOWING SUBACUTE EXPOSURE TO PCB. J. Environ. Pathol. Toxicol. 2 (4): 953-963. Mar.-Apr. 1979. SFA 24(3)
[D. E. Hinton: Dep. Pathol., Univ. Md. Sch. Med., Baltimore 21201] The response of the channel catfish liver to subacute exposure of polychlorinated biphenyls was evaluated using electron microscopic and biochemical techniques. After 21 days, treated fish displayed elevated microsomal enzyme activities. Morphologically, the liver produced several patterns of alteration involving the endoplasmic reticulum (ER).
Structural alterations included an increase in tubular smooth ER, production of parallel stacks of smooth ER showing continuity with rough ER, and membranous whorls. Biochemical and morphologic findings were correlated in exposed livers, and the relationship of these findings to similar studies in other species of fish is discussed.

79-002340 Kobayashi, K.; Akitake, H.; Manabe, K. RELATION BETWEEN TOXICITY AND ACCUMULATION OF VARIOUS CHLOROPHENOLS IN GOLDFISH. Bull. Jpn. Soc. Sci. Fish. 45 (2): 173-175. Feb. 1979. SFA 24(3)
[Lab. Fish. Chem., Fac. Agric., Kyushu Univ., Fukuoka, Japan]

79-002341 Kurelec, B.; Matijasevic, Z.; Rijavec, M.; Alacevic, M.; Britvic, S.; Muller, W. E. G.; Zahn, R. K. INDUCTION OF BENZO (A) PYRENE MONOOXYGENASE IN FISH AND THE SALMONELLA TEST AS A TOOL FOR DETECTING MUTAGENIC/CARCINOGENIC XENOBIOTICS IN THE AQUATIC ENVIRONMENT. Bull. Environ. Contam. Toxicol. 21 (6): 799-807. Apr. 1979. SFA 24(3)
[Kom. Molekularbiol. Akad. Wissenschoft. Lit., 6500 Mainz, West Germany]

79-002342 Lloyd, R.; Tooby, T. E. NEW TERMINOLOGY REQUIRED FOR SHORT-TERM STATIC FISH BIOASSAYS: IC(I)50. Bull. Environ. Contam. Toxicol. 22 (1-2): 1-3. May 1979. SFA 24(3)
[Salmon Freshwater Fish. Lab., Minist. Agric. Fish Food, Whitehall Place, London SW1A 2HH, England]

79-002343 Maki, A. W. CORRELATIONS BETWEEN /DAPHNIA MAGNA/ AND FATHEAD MINNOW (/PIMEPHALES PROMELAS/) CHRONIC TOXICITY VALUES FOR SEVERAL CLASSES OF TEST SUBSTANCES. J. Fish. Res. Board Can. 36 (4): 411-421. Apr. 1979. In English with French summ. SFA 24(3)
[Environ. Safety Dep., Procter and Gamble Co., Ivorydale Tech. Cent., Cincinnati, OH 45217]

79-002344 Matthews, G. M. EXPOSURE OF FINGERLING SPRING CHINOOK SALMON TO MIXTURES OF FURANACE-10, QUINALDINE, AND MS-222. Prog. Fish-Cult. 41 (2): 85-86. Apr. 1979. SFA 24(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

79-002345 McDonald, T. O.; Fingerman, M. EFFECTS OF DDT AND PARATHION ON GOLDFISH RETINA/PIGMENT EPITHELIUM/CHOROID CONCENTRATIONS OF SEROTONIN, DOPAMINE AND NOREPINEPHRINE. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A199. 30 Mar. 1979. Abstract only. SFA 24(3)
[Dep. Biol., Tulane Univ., New Orleans, LA 70118]

79-002346 McLeay, D. J.; Walden, C. C.; Munro, J. R. EFFECT OF PH ON TOXICITY OF KRAFT PULP AND PAPER MILL EFFLUENT TO SALMONID FISH IN FRESH AND SEAWATER. Water Res. 13 (3): 249-254. 1979. SFA 24(3)
[Div. Appl. Biol., B.C. Research, Vancouver, BC V6S 2I2, Canada] In freshwater bioassays with juvenile rainbow trout (/Salmo gairdneri/), at initial pH values from 4 to 11, kraft mill effluents were considerably less toxic at pH 9-10 than at neutrality. When pH of test solutions was controlled throughout the bioassay period, the least toxic range was 8.5-9.5. Toxicity at typical receiving-water pH values was 50-67 percent greater. The acute toxicity of effluent samples to yearling coho salmon (/Oncorhynchus kisutch/) was identical for these effluents in seawater and freshwater respectively, provided that the pH was adjusted and held at the same value, and that test fish were previously acclimated to the dilution water for several months. Thus seawater constituents other than pH did not affect the acute toxicity of pulp and paper mill effluents appreciably.

79-002347 Melancon, M. J., Jr.; Branson, D. R.; Lech, J. J. THE UPTAKE, ELIMINATION AND METABOLISM OF 1, 2, 4-TRICHLOROBENZENE IN RAINBOW TROUT. Toxicol. Appl. Pharmacol. 48 (1, Part 2): A170. 30 Mar. 1979. Abstract only. SFA 24(3)
[Dep. Pharmacol., Med. Coll. Wis., Milwaukee]

79-002348 Moskal'kova, K. I. THE INFLUENCE OF RADIOACTIVE CARBON C^{14} ON THE DEVELOPMENT OF THE EGGS OF THE ROUND GOBY, /NEOGOBIUS MELANOSTOMUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 18 (1): 157-161. 1978. SFA 24(3)
[IEMEZh, Moscow, USSR]

79-002349 Moy, D. C.; Dredge, M. C. L. A NOVEL BIOPSY TECHNIQUE FOR MONITORING ENVIRONMENTAL CONTAMINANTS IN FISH. Bull. Environ. Contam. Toxicol. 22 (1-2): 35-37. May 1979. SFA 24(3)
[Biochem. Br., Queensland Dep. Primary Industries, Anim. Res. Inst., 665 Fairfield Rd., Yeerongpilly, Queensland, Australia 4105]

79-002350 Narbonne, J. F. ACCUMULATION OF POLYCHLORINATED BIPHENYL (PHENOCLOR DP6) BY ESTUARINE FISH. Bull. Environ. Contam. Toxicol. 22 (1-2): 60-64. May 1979. SFA 24(3)
[Lab. Physiol. Nutr., Univ. Bordeaux 1, Ave. Facultes-33405 Talence, France] Fish intoxicated for 30 days by Phenoclor DP6 added either to water or food revealed an accumulation of PCB in all tissues measured. The highest concentration was found in the liver. There was a higher accumulation of PCB from water than from food. Little or no Phenoclor DP6 was metabolized by these fish. The results provide important data on the PCB accumulation in food chains.--Concl.

79-002351 Narbonne, J. F. POLYCHLORINATED BIPHENYL ACCUMULATION IN GREY MULLETS (/CHELON LABROSUS/): EFFECT OF AGE. Bull. Environ. Contam. Toxicol. 22 (1-2): 65-68. May 1979. SFA 24(3)
[Lab. Physiol. Nutr., Univ. Bordeaux 1, Ave. Facultes-33405 Talence, France]

79-002352 Orr, J. B.; Morgan, E. I.; Martine, I. ACUTE TOXICITY OF KEROSINE TO FATHEAD MINNOWS (/PIMEPHALES PROMELAS/). J. Tenn. Acad. Sci. 54 (2): 72. Apr. 1979. Abstract only. SFA 24(3)
[Tenn. Technol. Univ., Cookeville] To estimate the acute toxicity of kerosine to fathead minnows (/Pimephales promelas/), 24 hour static and 96 hour continuous flow bioassays were conducted in July 1978. A modified Mount-Brungs proportional dilutor and Freeman constant flow delivery device was constructed for use in the study. Kerosine, a major substance employed in industrial and trasportation operations, was tested at 25°C (plus or minus 1°C) in moderately hard water. Mortalities were recorded and plotted by log probit analysis. Bioassay results of kerosine reflect a 96 hour LC50 value of 8,980 ppm by volume. These findings reveal that under the conditions of this test, kerosine tends to be acutely lethal to one-half the fatheads tested at levels near 1 percent over a 4-day period. A concentration of about 5000 ppm (0.5 percent) was found necessary to cause 50 percent mortality during a 1-day static bioassay. Apparent discrepancy between static and constant flow bioassays appeared to be due to lack of aeration and mixing in the 24-hour test.

79-002353 Ozoh, P. T. E.; Jacobson, C.-O. EMBRYOTOXICITY AND HATCHABILITY IN /CICHLASOMA NIGROFASCIATUM/ (GUENTHER) EGGS AND LARVAE BRIEFLY EXPOSED TO LOW CONCENTRATIONS OF ZINC AND COPPER IONS. Bull. Environ. Contam. Toxicol. 21 (6): 782-786. Apr. 1979. SFA 24(3)
[Inst. Zool., Uppsala Univ. Box 561, S-751 22, Uppsala, Sweden]

79-002354 Ozoh, P. T. E. MALFORMATIONS AND INHIBITORY TENDENCIES INDUCED TO /BRACHYDANIO RERIO/ (HAMILTON-BUCHANAN) EGGS AND LARVAE DUE TO EXPOSURES IN LOW CONCENTRATIONS OF LEAD AND COPPER IONS. Bull. Environ. Contam. Toxicol. 21 (4/5): 668-675. Mar. 1979. SFA 24(3)
[Inst. Zool., Uppsala Univ., Box 561, S-751 22 Uppsala, Sweden]

79-002355 Ozoh, P. T. E. STUDIES ON INTRASPECIFIC TOXICITY OF LEAD TO /CICHLASOMA NIGROFASCIATUM/ (GUENTHER) DEVELOPMENT. Bull. Environ. Contam. Toxicol. 21 (4/5): 676-682. Mar. 1979. SFA 24(3)
[Inst. Zool., Uppsala Univ., Box 561, S-751 22 Uppsala, Sweden]

79-002356 Panwar, R. S.; Kapoor, D.; Joshi, H. C.; Gupta, R. A. TOXICITY OF SOME INSECTICIDES TO THE WEED FISH, /TRICHOGASTER FASCIATUS/ (BLOCH & SCHNEIDER). J. Inland Fish. Soc. India 8: 129-130. Dec. 1976. SFA 24(3)

79-002357 Pascoe, D.; Beattie, J. R. RESISTANCE TO CADMIUM BY PRETREATED RAINBOW TROUT ALEVINS. J. Fish Biol. 14 (3): 303-308. Mar. 1979. SFA 24(3)
[Dep. Appl. Biol., Univ. Wales Inst. Sci. Technol., Cardiff, Wales] A toxicity test with cadmium concentrations ranging from 0.1 to 100.0 mg Cd l^{-1} was used to assess the effect of cadmium pretreatment on rainbow trout (/Salmo gairdneri/ Richardson) alevins. The median period of survival for fish pretreated at 0.01 mg Cd l^{-1} was found to be increased at test concentrations up to 10 mg Cd l^{-1} compared with alevins pretreated with dilution water. However, at concentrations above 10 mg Cd l^{-1} pretreatment at 0.01 mg Cd l^{-1} reduced the median period of survival.

79-002358 Pfeifer, K. F. BIOCHEMICAL AND PHYSIOLOGICAL ASPECTS OF CARBON TETRACHLORIDE (CCl(4)) TOXICITY IN THE RAINBOW TROUT (/SALMO GAIRDNERI/). Ph.D. dissertation, Oreg. State Univ. 195p. 1979. From Diss. Abstr. Int. B Sci. Eng. 39(8):3611. Feb. 1979. SFA 24(3)
The results of this study indicate that plasma GPT activity appears to be a sensitive indicator of CCl(4) toxicity in the rainbow trout and that measurments of plasma enzymes can be useful tools to assess chemically-induced organ damage in fishes. The results show that diet may be a significant variable in fish toxicological studies. In addition, other biochemical and physiological parameters can prove beneficial in the overall assessment of chemical toxicity to fish.--From abstr.

79-002359 Randall, W. F.; Dennis, W. H.; Warner, M. C. ACUTE TOXICITY OF DECHLORINATED DDT, CHLORDANE AND LINDANE TO BLUEGILL (/LEPOMIS MACROCHIRUS/) AND /DAPHNIA MAGNA/. Bull. Environ. Contam. Toxicol. 21 (6): 849-854. Apr. 1979. SFA 24(3)
[U.S. Army Med. Bioeng. Res. Dev. Lab., Fort Detrick, Frederick, MD 21701]

79-002360 Ross, L. G.; Geddes, J. A. SEDATION OF WARM-WATER FISH SPECIES IN AQUACULTURE RESEARCH. Aquaculture 16 (2): 183-186. Feb. 1979. SFA 24(3)
[Unit Aquatic Pathobiol., Univ. Stirling, Stirling FK9 4LA, Scotland]

79-002361 Sangalang, G. B.; Freeman, H. C. TISSUE UPTAKE OF CADMIUM IN BROOK TROUT DURING CHRONIC SUBLETHAL EXPOSURE. Arch. Environ. Contam. Toxicol. 8 (1): 77-84. 1979. SFA 24(3)
[Fish. Mar. Serv., 1707 Lower Water St., Halifax, NS B3J 2R3, Canada]

79-002362 Sastry, K. V.; Gupta, P. K. THE /IN VIVO/ EFFECT OF MERCURIC CHLORIDE ON SOME DIGESTIVE ENZYMES OF A FRESH WATER TELEOST FISH, /CHANNA PUNCTATUS/. Bull. Environ. Contam. Toxicol. 22 (1-2): 9-16. May 1979. SFA 24(3)
[Dep. Zool., D.A. V. (P.G.) Coll., Muzaffarnagar, India] Alterations in the activities of alkaline phosphatase, acid phosphatase, glucose-6-phosphatase amylase, trypsin, Pepsin, aminotripeptidase, glycylglycine dipeptidase and carnosinase due to exposure of /Channa punctatus/ to a sublethal concentration (0.30 mg/L) of mercuric chloride by bath for 20 days have been studied in the different parts of the digestive system. A fall in the activities of the three phosphatases was recorded except for alkaline phosphatase which showed a slight elevation in activity in intestine and pyloric caeca. An increase in the activity of amylase and the two proteases was observed in all the portions of the digestive system. The three peptidases revealed a decrease in activity.--Summ.

79-002363 Sastry, K. V.; Gupta, P. K.; Malik, P. V. A COMPARATIVE STUDY OF THE EFFECT OF ACUTE AND CHRONIC MERCURIC CHLORIDE TREATMENT ON THE ACTIVITIES OF A FEW DIGESTIVE ENZYMES OF A TELEOST FISH, /CHANNA PUNCTATUS/. Bull. Environ. Contam. Toxicol. 22 (1-2): 28-34. May 1979. SFA 24(3)
[Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar, India] In this study a comparison of the effect of exposure of /Channa punctatus/ to LC(50) (1.8 mg/L) and a sublethal concentration (0.30 mg/L) of mercuric chloride on the activities of maltase, lactase leucyl-L-glycine dipeptidase and lipase has been made. After 96 hr of treatment, a slight elevation in maltase activity was recorded in all portions of the digestive system. Lipase and leucyl-L-glycine dipeptidase showed inhibition in activity. Chronic treatment for 20 days revealed a significant inhibition in the activities of all the four enzymes.--Summ.

79-002364 Sastry, K. V.; Agrawal, M. K. EFFECTS OF LEAD NITRATE ON THE ACTIVITIES OF A FEW ENZYMES IN THE KIDNEY AND OVARY OF /HETEROPNEUSTES FOSSILIS/. Bull. Environ. Contam. Toxicol. 22 (1-2): 55-59. May 1979. SFA 24(3)
[Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar, U.P, India]

79-002365 Sastry, K. V.; Sharma, S. K. ENDRIN TOXICOSIS ON FEW ENZYMES IN LIVER AND KIDNEY OF /CHANNA PUNCTATUS/ (BICCH). Bull. Environ. Contam. Toxicol. 22 (1-2): 4-8. May 1979. SFA 24(3)
[Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar, India]

79-002366 Sastry, K. V.; Agrawal, M. K. MERCURIC CHLORIDE INDUCED ENZYMOLOGICAL CHANGES IN KIDNEY AND OVARY OF A TELEOST FISH, /CHANNA PUNCTATUS/. Bull. Environ. Contam. Toxicol. 22 (1-2): 38-43. May 1979. SFA 24(3)
[Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar, U.P., India] The effect of LC(50) (1.8 mg/L) and a sublethal concentration (0.30 mg/L) of /in vivo/ mercuric chloride exposure on the activities of acid and alkaline phosphatases, glucose-6-phosphatase, lipase and urease in the kidneys and ovaries of a teleost fish, /Channa punctatus/ has been studied after 96 hr and 30 days respectively. It has been observed that the activities of all the enzymes except acid phosphatase were significanly inhibited in both the tissues. However, treatment for 96 hr resulted in more marked inhibition than 30 days of treatment. Acid phosphatase showed elevation in activity in the kidney after 96 hr of treatment.--Summ.

79-002367 Seegert, G. L.; Brooks, A. S.; Vande Castle, J. R.; Gradall, K. THE EFFECTS OF MONOCHLORAMINE ON SELECTED RIVERINE FISHES. Trans. Am. Fish. Soc. 108 (1): 88-96. Jan. 1979. SFA 24(3)
[Jack McCormick & Assoc., 511 Old Lancaster Rd., Berwyn, PA 19312]

79-002368 Sharma, S. K.; Sastry, K. V. ALTERATION IN ENZYME ACTIVITIES IN LIVER AND KIDNEY OF /CHANNA PUNCTATUS/ EXPOSED TO ENDRIN. Bull. Environ. Contam. Toxicol. 22 (1-2): 17-20. May 1979. SFA 24(3)
[Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar, India] Treatment of /Channa punctatus/ with 0.01 mg/L of endrin for 20 days, results in the inhibition of some enzymes like alkaline phosphatase and glucose-6-phosphatase. However, the extent of the damage caused is not so severe as to inhibit all enzymes; the activity of amylase increased. This may be due to the low concentration of endrin and the short term treatment.

79-002369 Sigmon, C. OXYGEN CONSUMPTION IN /LEPOMIS MACROCHIRUS/ EXPOSED TO 2,4-D OR 2,4,5-T. Bull. Environ. Contam. Toxicol. 21 (6): 826-830. Apr. 1979. SFA 24(3)
[Zool. Dep., Clemson Univ., Clemson, SC 29631]

79-002370 Sills, J. B.; Allen, J. I. RESIDUES OF FORMALDEHYDE UNDETECTED IN FISH EXPOSED TO FORMALIN. Prog. Fish-Cult. 41 (2): 67-68. Apr. 1979. SFA 24(3)
[U.S. FWS, P.O. Box 9, Warm Springs, GA 31830]

79-002371 Sitthichaikasem, S. SOME TOXICOLOGICAL EFFECTS OF PHOSPHATE ESTERS ON RAINBOW TROUT AND BLUEGILL. Ph.D. dissertation, Iowa State Univ. 272p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(2):538. Aug. 1978. SFA 24(3)

79-002372 Smith, M. J.; Heath, A. G. ACUTE TOXICITY OF COPPER, CHROMATE, ZINC, AND CYANIDE TO FRESHWATER FISH: EFFECT OF DIFFERENT TEMPERATURES. Bull. Environ. Contam. Toxicol. 22 (1-2): 113-119. May 1979. SFA 24(3)
[Dep. Biol., VPI&SU, Blacksburg, VA 24061]

79-002373 Smith, R. L.; Cameron, J. A. EFFECT OF WATER SOLUBLE FRACTION OF PRUDHOE BAY CRUDE OIL ON EMBRYONIC DEVELOPMENT OF PACIFIC HERRING. Trans. Am. Fish. Soc. 108 (1): 70-75. Jan. 1979. SFA 24(3)
[Prog. Biol. Sci., Univ. Alaska, Fairbanks 99701]

79-002374 Spehar, R. L.; Veith, G. D.; DeFoe, D. L.; Bergstedt, B. V. TOXICITY AND BIOACCUMULATION OF HEXACHLOROCYCLOPENTADIENE, HEXACHLORONORBORNADIENE AND HEPTACHLORONORBORNENE IN LARVAL AND EARLY JUVENILE FATHEAD MINNOWS, /PIMEPHALES PROMELAS/. Bull. Environ. Contam. Toxicol. 21 (4/5): 576-583. Mar. 1979. SFA 24(3)
[U.S. EPA, Environ. Res. Lab., 6201 Congdon Blvd., Duluth, MN 55804]

79-002375 Srivastava, A. K.; Mishra, S. BLOOD DYSCRASIA IN A TELEOST, /COLISA FASCIATUS/ AFTER ACUTE EXPOSURE TO SUBLETHAL CONCENTRATIONS OF LEAD. J. Fish Biol. 14 (2): 199-203. Feb. 1979. SFA 24(3)
[Dep. Zool., Univ. Gorakhpur, Gorakhpur 273 001, U.P., India]

79-002376 Srivastava, A. K.; Agrawal, S. J. HAEMATOLOGICAL ANOMALIES IN A FRESH WATER TELEOST, /COLISA FASCIATUS/, ON ACUTE EXPOSURE TO COBALT. Acta Pharmacol. Toxicol. 44 (3): 197-199. Mar. 1979. SFA 24(3)
[Dep. Zool., Univ. Gorakhpur, Gorakhpur 273001 U.P., India]

79-002377 Suzuki, A.; Sekizawa, Y. RESIDUE ANALYSES ON 2-AMINO-4-PHENYLTHIAZOLE, A PISCINE ANESTHETIC, IN FISHES--I.V. GC/MS ANALYSIS ON RAINBOW TROUT. Bull. Jpn. Soc. Sci. Fish. 45 (2): 167-171. Feb. 1979. SFA 24(3)
[Res. Lab., Meiji Seika Kaisha, Ltd., Morooka-Cho, Kohoku-ku, Yokohama, Japan]

79-002378 Svobodova, Z.; Hejtmanek, M.; Vostradovsky, J. SLEDOVANI OBSAHU RTUTI V RYBACH ODLOVENYCH VE VODARENSKYCH NADRICH. [DETERMINING TOTAL MERCURY CONTENT IN FISH FROM WATER-SUPPLY RESERVOIRS.] Veterin. Zpravy 1978: 84-88. 1978. In Czech with English summ. SFA 24(3)

79-002379 Tomasso, J. R.; Goudie, C. A.; Simco, B. A. EFFECTS OF ENVIRONMENTAL PH AND CALCIUM ON AMMONIA TOXICITY IN CHANNEL CATFISH (/ICTALURUS PUNCTATUS/). J. Tenn. Acad. Sci. 54 (2): 72. Apr. 1979. Abstract only. SFA 24(3)
[Memphis State Univ., Memphis, TN] The twenty-four hour median lethal concentrations of total ammonia nitrogen (NH(3)-N) to channel catfish fingerlings (/Ictalurus punctatus/) at pH 7, 8, and 9 (total hardness = 40 ppm; temperature = 21-24°C) were 263.6 plus or minus 11.3 (S.E.), 38.8 plus or minus 1.8 and 4.5 plus or minus 0.2 ppm, respectively. The un-ionized ammonia nitrogen concentration at pH 8 was significantly higher (1.82 plus or minus 0.06 ppm) than at pH 7 or 9 (1.39 plus or minus 0.6 and 1.49 plus or minus 0.12 ppm). Enrichment of the water to 200 ppm calcium at pH 7 significantly increased the 24 hr L.C.(50) of total and un-ionized ammonia nitrogen (356.3 plus or minus 16.4 and 1.79 plus or minus 0.07). Fish exposed to 25 ppm NH(3)-N for 12 hours at pH 7 and 8 showed no differences in hematocrit, percent total plasma protein, or plasma and muscle chloride as compared to control fish. Plasma sodium showed no difference between control and experimental groups at pH 7; however, a significant decrease occurred in fish exposed to 25 ppm NH(3)-N at pH 8. No differences in blood pH were found between the control groups and fish exposed to 100 and 200 ppm NH(3)-N at pH 7, and 10 and 25 ppm NH(3)-N at pH 8.

79-002380 Ultsch, G. R.; Gros, G. MUCUS AS A DIFFUSION BARRIER TO OXYGEN: POSSIBLE ROLE IN O(2) UPTAKE AT LOW PH IN CARP (/CYPRINUS CARPIO/) GILLS. Comp. Biochem. Physiol. A Comp. Physiol. 62 (3): 685-689. 1979. SFA 24(3)
[Dep. Biol., Univ. Ala., University 35486]

79-002381 Verma, S. R.; Bansal, S. K.; Gupta, A. K.; Dalela, R. C. IN VIVO EFFECT ON ATPASE IN CERTAIN TISSUES OF /LABEO ROHITA/ AND /SACCOBRANCHUS FOSSILIS/, FOLLOWING CHRONIC CHLORDANE INTOXICATION. Bull. Environ. Contam. Toxicol. 20 (6): 769-777. Dec. 1978. SFA 24(3)
[Pollut. Relevant Res. Lab., Dep. Zool., D.A.V. (P.G.) Coll., Muzaffarnagar-251001, India]

79-002382 Verma, S. R.; Tyagi, A. K.; Bhatnagar, M. C.; Dalela, R. C. ORGANOPHOSPHATE POISONING TO SOME FRESH WATER TELEOSTS--ACETYLCHOLINESTERASE INHIBITION. Bull. Environ. Contam. Toxicol. 21 (4/5): 502-506. Mar. 1979. SFA 24(3)
[Pollut. Relevant Res. Lab., Post-grad. Dep. Zool., D.A.V. Coll., Muzaffarnagar-251001 India]

79-002383 Verma, S. R.; Pal, N.; Tyagi, A. K.; Dalela, R. C. TOXICITY OF SWASCOL 1P (SLS) TO /CHANNA PUNCTATUS/ AND /CIRRHINA MRIGALA/: BIOCHEMICAL ALTERATIONS. Bull. Environ. Contam. Toxicol. 21 (4/5): 711-718. Mar. 1979. SFA 24(3)
[Pollut. Relevant Res. Lab., Post-Grad. Dep. Zool., D.A.V. Coll., Muzaffarnagar-251001, India]

79-002384 Wallace, D.; Norris, L. A.; Hawkes, C. L. TCDD IN THE ENVIRONMENT. Trans. Am. Fish. Soc. 108 (1): 103-109. Jan. 1979. SFA 24(3)
[Power Authority, State of N.Y., 10 Columbus Circle, New York 10019]

79-002385 Wiener, J. G.; Giesy, J. P., Jr. CONCENTRATIONS OF CD, CU, MN, PB, AND ZN IN FISHES IN A HIGHLY ORGANIC SOFTWATER POND. J. Fish Res. Board Can. 36 (3): 270-279. Mar. 1979. In English with French summ. SFA 24(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

79-002386 Yosha, S. F.; Cohen, G. M. EFFECT OF INTERMITTENT CHLORINATION ON DEVELOPING ZEBRAFISH EMBRYOS (/BRACHYDANIO RERIO/). Bull. Environ. Contam. Toxicol. 21 (4/5): 703-710. Mar. 1979. SFA 24(3)
[C. V. Whitney Mar. Res. Lab., Univ. Fla., St. Augustine 32084]

79-002387 Zitko, V.; McLeese, D. W.; Metcalfe, C. D.; Carson, W. G. TOXICITY OF PERMETHRIN, DECAMETHRIN, AND RELATED PYRETHROIDS TO SALMON AND LOBSTER. Bull. Environ. Contam. Toxicol. 21 (3): 338-343. Feb. 1979. SFA 24(3)
[Biol. Stn., St. Andrews, NB E0G 2X0, Canada] (IR)-/cis/-permethrin, decamethrin, and NRDC 168S are extremely lethal to salmon and lobster. The increase in lethality relative to that of permethrin follows qualitatively the patterns established in toxicity studies with insects: (IR)-/cis/ isomers are more lethal than (IR)-/trans/,

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and the presence of an alpha-cyano group in the phenoxybenzyl moiety increases the lethality. The latter effect is very pronounced for lobsters. The octanol/water partition coefficient alone is not sufficient for predicting the lethality of pyrethroids to salmon or lobster.--Concl.

FISH TOXICANTS

79-002388 Hudson, R. H. TOXICITIES OF THE IAMPRICIDES 3-TRIFLUOROMETHYL- 4-NITROPHENOL (TFM) AND THE 2-AMINOETHANOL SALT OF 2', 5-DICHLORO-4'- NITROSALICYLANILIDE (BAYER 73) TO FOUR BIRD SPECIES. U.S. Fish Wildl. Serv. Invest. Fish Control 89. 5p. 1979. SFA 24(3)
[Dep. Zool., Univ. Wash., Seattle 98195]

79-002389 Launer, C. A.; Bills, T. D. INFLUENCES OF SELECTED ENVIRONMENTAL FACTORS ON THE ACTIVITY OF A PROSPECTIVE FISH TOXICANT, 2-(DIGERANYLAMINO)-ETHANOL, IN LABORATORY TESTS. U.S. Fish Wildl. Serv. Invest. Fish Control 88. 4p. 1979. SFA 24(3)
[U.S. FWS, Natl. Fish. Res. Lab. LaCrosse, WI 54601] Fathead minnows (/Pimephales promelas/), brown trout (/Salmo trutta/), and rainbow trout (/S. gairdneri/) were used to assess the influences of temperature, pH, turbidity, ultraviolet light, and aquatic vegetation on the toxicity of an experimental fish toxicant, 2-(digeranylamino)-ethanol (GD-174). Also examined was the feasibility of chemical counteraction by oxidation or reduction. The activity of the compound was reduced in cold water, in acid water, and in turbid water where the turbidities were produced by bentonite or Crowley silt loam, and in water containing waterweed (/Elodea/ sp.). The activity was not affected by exposure to ultraviolet light, by the presence of duckweed (/Lemna/ sp.), or by turbidities produced by kaolin or barium sulfate. GD-174 can be counteracted by either oxidation or reduction: oxidation by potassium permanganate was the most effective procedure tested.

79-002390 Nandy, A. C.; Chakraborty, D. P. A NOTE ON THE USE OF UNRIPE FRUITS OF /RANDIA DUMETORUM/ LAM. AS A FISH POISON. J. Inland Fish. Soc. India 8: 134-136. Dec. 1976. SFA 24(3)

RESEARCH AND MANAGEMENT-GENERAL

79-002391 Berkes, F. AN INVESTIGATION OF CREE INDIAN DOMESTIC FISHERIES IN NORTHERN QUEBEC. Arctic 32 (1): 46-70. Mar. 1979. In English with French summ. SFA 24(3)
[Inst. Urban Environ. Stud. Brock Univ., St. Catharines, ON L2S 3A1, Canada] Domestic or subsistence fisheries of the eastern James Bay Cree were studied, mainly in Fort George, by direct observation. These fisheries were characterized by large numbers of participants, low catches per day and per fisherman, but high catches per length of net used, as compared to commercial fisheries. Most stocks appear lightly utilized, but in the vicinity of larger settlements there is evidence that some stocks are overfished. The total catch may be increased by distributing the fishing effort more evenly over a larger area. Fish resource base of the region appears suitable for supporting local economic development with respect to recreational fisheries and native-run commercial fisheries for the local market, as well as

79-002391 CONTINUED
maintaining the domestic fishery.

79-002392 Leopold, M. , (compiler) GLOSSARY OF INLAND FISHERY TERMS. FAO of the UN EIFAC Occas. Pap. no. 12. iii + 126p. 1978. SFA 24(3)
[Inland Fish. Inst., Olsztyn, Poland]

79-002393 Montanari, J. H.; Kusler, J. A. , (symp. co-chairman) NATIONAL WETLAND PROTECTION SYMPOSIUM. U.S. Fish Wildl. Serv. FWS/OBS-78/97. viii + 255p. Nov. 1978. SFA 24(3)
[U.S. FWS, St. Petersburg, FL] A collection papers.--RS

79-002394 Sonnevil, G. M. RESTORATION STATUS OF THE CUI-UI. Cal-Neva Wildl. Trans. p. 18-22. 1978. SFA 24(3)
[U.S. FWS, Reno, NV 89502] Restoration progress for the cui-ui includes: an artificial propagation program, the Pyramid Lake Fishway, and population monitoring. Fish passage problems have been experienced with the fishway and evaluation is continuing. Population monitoring indicates that the population may be declining much more rapidly than previously thought.

79-002395 Warner, K. MORTALITY OF LANDLOCKED ATLANTIC SALMON HOOKED ON FOUR TYPES OF FISHING GEAR AT THE HATCHERY. Prog. Fish-Cult. 41 (2): 99-102. Apr. 1979. SFA 24(3)
[Me. Dep. Inland Fish. Wildl., Bangor 04401]

79-002396 Wilson, J. I.; Cottrell, K. D. CATCHABILITY AND ORGANOLEPTIC EVALUATION OF GRASS CARP IN EAST TENNESSEE PONDS. Trans. Am. Fish. Soc. 108 (1): 97-99. Jan. 1979. SFA 24(3)
[Dep. For. Wildl. Fish., Univ. Tenn., Knoxville 37901]

ADMINISTRATION AND PLANNING

79-002397 Lackey, R. T. OPTIONS AND LIMITATIONS IN FISHERIES MANAGEMENT. Environ. Manage. 3 (2): 109-112. Mar. 1979. SFA 24(3)
[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061]

REPORTS OF FISHERY STATIONS, STATES, ETC.

79-002398 Parliament of New South Wales REPORT ON THE FISHERIES IN NEW SOUTH WALES FOR 1975-1976. New South Wales State Fish., Australia 26p. 1977. SFA 24(3)
[New South Wales, Australia]

HABITAT ALTERATION

79-002399 Cope, O. B. , (ed.) PROCEEDINGS OF THE FORUM--GRAZING AND RIPARIAN/STREAM ECOSYSTEMS. Trout Unlimited, Inc. iv + 94p. Mar. 1979. Available at $3.00 from TU, 118 Park St. SE, Vienna, VA 22180. SFA 24(3)

79-002400 Dudley, R. G. CHANGES IN GROWTH AND SIZE DISTRIBUTION OF /SAROTHERODON MACROCHIR/ AND /SAROTHERODON ANDERSONI/ FROM THE KAFUE FLOODPLAIN, ZAMBIA SINCE CONSTRUCTION OF THE KAFUE GORGE DAM. J. Fish Biol. 14 (2): 205-223. Feb. 1979. SFA 24(3)
[Sch. For. Resour., Univ. Ga., Athens 30602] The Kafue floodplain produces an annual fish yield of about 5000 tonnes. The 1971 closure of the Kafue Gorge Dam downstream from the floodplain modified flooding patterns and created some question as to whether conditions for growth and reproduction of major species would be adversely affected or improved. No obvious changes in the growth of the two major species, /Sarotherodon andersoni/ and /S. macrochir/, that could be related to the dam were found in samples collected in 1975. Available data concerning year class fluctuations and size distribution indicate that typical high post-impoundment water levels may limit reproduction and year class size of these /Sarotherodon/ species.

79-002401 Fisheries and Oceans Canada GUIDELINES FOR LAND DEVELOPMENT AND PROTECTION OF THE AQUATIC ENVIRONMENT. Fish. Oceans Can. Fish. Mar. Serv. Tech. Rep. no. 807. iv + 55p. July 1978. SFA 24(3)
[1090 W. Pender St., Vancouver, BC V6E 2PI, Canada]

79-002402 Harper, J. B.; Stanton, G. E.; Brown, W. G.; Hale, S.; Walker, D. DIFFERENCES AMONG SEINE-HAUL CATCHES OF FISH FROM SAND-GRAVEL PIT PONDS IMPACTED BY AND THOSE NOT IMPACTED BY A MUNICIPAL LANDFILL. Ga. J. Sci. 37 (2): 60. Apr. 1979. Abstract only. SFA 24(3)
[Columbus Coll., Columbus, GA]

79-002403 Hathaway, C. B., Jr. STREAM CHANNEL MODIFICATION IN HAWAII PART C: TOLERANCE OF NATIVE STREAM SPECIES TO OBSERVED LEVELS OF ENVIRONMENTAL VARIABILITY. U.S. Fish Wildl. Serv. FWS/OBS-78/18. x + 59p. Oct. 1978. SFA 24(3)
[Hawaii Coop. Fish. Res. Unit, 2538 The Mall, Univ. Hawaii, Honolulu 96822]

79-002404 Loch, J. S.; Derkson, A. J.; Hora, M. E.; Oetting, R. B. POTENTIAL EFFECTS OF EXOTIC FISHES ON MANITOBA: AN IMPACT ASSESSMENT OF THE GARRISON DIVERSION UNIT. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 838. iv + 39p. Feb. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada] The proposed Garrison Diversion would divert waters from the Missouri River Basin down the McClusky Canal through a 40 mesh fish screen located in the Hudson Bay drainage basin. Water would then be distributed in North Dakota for agricultural, municipal and industrial uses. Return flows would enter Hudson Bay drainages and adversely affect Canadian waters. Twenty species of fish would be introduced via

79-002404 CONTINUED
the Garrison Diversion, resulting in a reduction of 15-75 percent of lake whitefish and walleye in Lake Winnipeg and Lake Manitoba. Rainbow smelt, gizzard shad and Utah chub are the problem species. Concomitant implementation of amelioration measures including elimination of wasteways, installation of sand filters, modifications to the McClusky Canal Fish Screen and development of operating criteria are recommended to alleviate fish passage problems. The McClusky Canal Fish Screen could not be relied upon to prevent fish passage and because the resultant impacts were so potentially damaging that the proposed amelioration measures would not provide a sufficient guarantee against interbasin transfer of foreign biota.--From abstr.

79-002405 McCracken, F. D. (ed.) CANSO MARINE ENVIRONMENT WORKSHOP PART 1 OF 4 PARTS. EXECUTIVE SUMMARY. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 834. vii + 17p. Jan. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

79-002406 Moore, R.; Mills, T. AN ENVIRONMENTAL GUIDE TO WESTERN SURFACE MINING PART TWO: IMPACTS, MITIGATION AND MONITORING. U.S. Fish Wildl. Serv. FWS/OBS-78/04. 482p. Dec. 1977. SFA 24(3)
[Ecology Consultants, Inc., P.O. Box 2105, Fort Collins, CO 80522]

79-002407 Parrish, J. D.; Maciolek, J. A.; Timbol, A. S.; Bathaway, C. B., Jr.; Norton, S. E. STREAM CHANNEL MODIFICATION IN HAWAII PART D: SUMMARY REPORT. U.S. Fish Wildl. Serv. FWS/OBS-78/19. x + 18p. Oct. 1978. SFA 24(3)
[Hawaii Coop. Fish Res. Unit, 2538 The Mall, Univ. Hawaii, Honolulu 96822]

79-002408 Platts, W. S. LIVESTOCK INTERACTIONS WITH FISH AND THEIR ENVIRONMENTS: A SYMPOSIUM SUMMARY. Cal-Neva Wildl. Trans. p. 92-96. 1978. SFA 24(3)
[USDA, Ogden, UT 84401] This report assesses the influences livestock have on aquatic and riparian environments, provides recommendations for more compatibility between livestock grazing and fisheries, lists management objectives for protecting, restoring or enhancing fish and riparian habitats, and describes beneficial management practices. The importance of recognizing the riparian ecosystem as a separate management unit within the range system, as defined by the Forest Service, was emphasized.

79-002409 Srinivasan, S. R. WATER QUALITY CHANGES IN AN IMPOUNDMENT AS A CONSEQUENCE OF ARTIFICIAL DESTRATIFICATION. Ph.D. dissertation, Univ. Okla. 239p. 1978. From Diss. Abstr. Int. B Sci. Eng. 39(11): 5303. May 1979. SFA 24(3)

79-002410 Stober, Q. J.; Tyler, R. W.; Knutzen, J. A.; Gaudet, D.; Petrosky, C. E.; Nakatani, R. E. OPERATIONAL EFFECTS OF IRRIGATION AND PUMPED STORAGE ON THE ECOLOGY OF BANKS LAKE, WASHINGTON. U.S. Dep. Interior Bur. Reclam. Eng. Res. Cent. Rep. REC-ERC-77-5. 153p. Dec. 1977. SFA 24(3)
[Fish. Res. Inst., Coll. Fish., Univ. Wash., Seattle]

79-002411 Woodward-Clyde Consultants IMPACT PREDICTION MANUAL FOR GEOTHERMAL DEVELOPMENT. U.S. Fish Wildl. Serv. FSW/OBS-78/77. v + 153p. June 1978. SFA 24(3)
[Three Embarcadero Cent., Suite 700, San Francisco, CA 94111]

HARVEST, CREEL CENSUS

79-002412 Chavez, H.; Silva, S.; Sunada, J. S. THE FISHERY FOR NORTHERN ANCHOVY, /ENGRAULIS MORDAX/, OFF CALIFORNIA AND BAJA CALIFORNIA IN 1975. Calif. Coop. Oceanic Fish Invest. Rep. 19: 147-165. Oct. 1977. In English with Spanish summ. SFA 24(3)
[Inst. Nacl. Pesca, Mexico City, Mexico] Anchovy landings during 1975 totaled 200,663 metric tons (221,201 tons) of which 143,786 mt (158,505 tons) were caught by the U.S. and 56,877 mt (62,695 tons) by Mexico. Age data from both countries were dominated by the 1972 year class. Anchovy mean lengths ranged from 116.8 mm standard length (Baja California) to 137.7 mm standard length (central California). Female to male ratios ranged from 1.6 to 1 (southern California) to 2.8 to 1 (Baja California).

79-002413 Lal, K. CALIFORNIA INLAND ANGLING TRENDS FOR 1971 THROUGH 1974. Calif. Fish Game 65 (1): 4-22. Jan. 1979. SFA 24(3)
[Calif. Dep. Fish Game, Inland Fish. Br., Sacramento 95814] This is the eleventh report on California inland sport fish catch estimates based on angler response to postal card questionnaires. Each year from 1971 through 1974, between 0.55-0.59 percent of the resident license buyers were mailed a questionnaire. Of these, 30-41 percent responded, providing a systematic sample of 0.17-0.24 percent. About 2,189,000 anglers, or nearly 11 percent of all Californians, purchased a sport fishing license in 1974. Estimated annual catch and effort by successful anglers was determined for trout, catfish, panfish, black bass, striped bass, sturgeon, and frogs. License sales, fishing pressure, and the catch estimates for black bass, striped bass, and frogs reached an all time high in 1974. Median catch per angler day was highest for frogs and lowest for sturgeon.

79-002414 Malvestuto, S. P.; Davies, W. D.; Shelton, W. L. PREDICTING THE PRECISION OF CREEL SURVEY ESTIMATES OF FISHING EFFORT BY USE OF CLIMATIC VARIABLES. Trans. Am. Fish. Soc. 108 (1): 43-45. Jan. 1979. SFA 24(3)
[Auburn Univ. Exp. Stn., Dep. Fish Allied Aquacult., Auburn, AL 36830]

79-002415 Mense, J. E. FISHERMAN POSTAL SURVEY 1977. Okla. Fish. Res. Lab. Bull. no. 15. 22p. Mar. 1978. SFA 24(3)
[Okla. Fish. Res. Lab., Norman]

79-002416 Pristas, P. J. BIG GAME FISHING IN THE NORTHERN GULF OF MEXICO DURING 1977. Natl. Mar. Fish. Serv., Panama City, FL 37p. Apr. 1978. SFA 24(3)
[NMFS, Southeast Fish. Cent., Panama City, FL]

79-002417 Sarig, S. FISHERIES AND FISH CULTURE IN ISRAEL IN 1977. Bamidgeh 30 (4): 91-103. Dec. 1978. SFA 24(3)
[Lab. Res. Fish. Dis., Nir-David, Israel]

79-002418 Smith, J. E. CATCH AND EFFORT STATISTICS OF THE CANADIAN GROUNDFISH FISHERY ON THE PACIFIC COAST IN 1977. Fish Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 835. iv + 85p. Sept. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

79-002419 Summers, G. L. SPORTFISHING STATISTICS OF OKLAHOMA RESERVOIRS. Okla. Fish. Res. Lab. Bull. no. 14. 113p. Jan. 1978. SFA 24(3)
[Okla. Fish. Res. Lab., Norman]

79-002420 Walker, M. H. UTILIZATION OF THE BUNBURY AND GEOGRAPHE BAY MARINE RESOURCE BY PROFESSIONAL AND AMATEUR FISHERMEN. West. Aust. Mar. Res. Lab. Rep. No. 36. 63p. 1978. SFA 24(3)
[West. Aust. Mar. Res. Lab., P.O. Box 20, North Beach, Western Australia, 6020 Australia]

REGULATIONS

79-002421 Azevedo, B. INDIAN FISHING RIGHTS: WHERE ARE WE - HOW DID WE GET HERE - AND WHERE ARE WE GOING? Cal-Neva Wildl. Trans. p. 258-269. 1978. SFA 24(3)

79-002422 Erickson, K. LENGTH LIMIT STUDIES: A FIRST YEAR REPORT. Outdoor Okla. 35 (6): 2-5. June 1979. SFA 24(3)
[Okla. Dep. Wildl. Conserv., 1801 N. Lincoln blvd., Oklahoma City 73152]

79-002423 Roger, P. E. AN INDIAN PERSPECTIVE OF ANADROMOUS FISHERIES MANAGEMENT. Cal-Neva Wildl. Trans. p. 115-121. 1978. SFA 24(3)
[Quinault Dep. Nat. Resour., Taholah, WA 98587] Problems in salmon and steelhead management related to Indian fishing rights in Washington State may be grouped into three categories: legal and political, logistic and procedural, and technical. A comprehensive solution to the present controversy must address itself to the major problems in each of these three areas. Substantial progress toward solving the legal and political problems must occur before logistic and technical problems can be addressed, however. The decision in U.S. v Washington covers 20 recognized and 5 unrecognized Indian tribes located on the Olympic Peninsula, throughout the Puget Sound basin, and in portions of the Columbia River watershed. The Quinault Indian Nation is one of the larger tribes involved in U.S. v Washington both in size of its reservation and population and in the extent of its fishery. The perspective on anadromous fisheries management presented here represents the views of the Quinault Nation and is generally shared by many of the other case area tribes, although I do not purport to represent them.

FISH CONTROL AND REMOVAL

79-002424 Avery, E. L. THE INFLUENCE OF CHEMICAL RECLAMATION ON A SMALL BROWN TROUT STREAM IN SOUTHWESTERN WISCONSIN. Wis. Dep. Nat. Resour. Tech. Bull. No. 110. 35p. 1978. SFA 24(3)

[Wis. Dep. Nat. Resour., Box 79211, Madison 53707] Seas Branch Creek was treated with antimycin A in October 1972 to eradicate a forage fish population consisting primarily of suckers, stonerollers, daces, and darters. The aquatic invertebrate community, fish populations, and sport fishery for stocked brown trout were studied for two years before and two years after chemical treatment. Significant improvements occurred in the growth, standing crop and production of stocked brown trout after removal of up to 1,445 kg/ha of forage fish. The number of invertebrate orders represented in at least 30 percent of the trout stomachs also doubled, indicating that interspecific competition for food existed before treatment. Survival of trout did not improve following forage fish removal, nor did it improve significantly after a reduction of 50 percent in the stocking density. Poor survival and low carrying capacity of the stream were related to the lack of permanent instream cover. The sport fishery was primarily of local interest; over 70 percent of the anglers fishing the stream before and after treatment live within a 10-mile radius. The number of fishing trips and total fishing pressure increased following treatment but total harvest and catch ratio declined. The absence of trout greater than 30 cm during the first year after treatment was primarily responsible for the total decline in harvest during the two-year, post-treatment study. A culvert-type fish barrier proved effective in preventing access upstream to forage fishes.--From abstr.

79-002425 Davis, R. THE USE OF ANTIMYCIN TO REDUCE STUNTED SUNFISH POPULATIONS IN HARDWATER LAKES. Minn. Dep. Nat. Resour. Sect. Fish. Invest. Rep. No. 363. 23p. Mar. 1979. SFA 24(3)

[Minn. Dep. Nat. Resour., St. Paul] The treatment of two hardwater lakes with antimycin to reduce the abundance of slow-growing sunfish populations resulted in significant changes in one lake but only slight changes in the other. The two treatments of Lake Mary were followed by improved growth and condition of bluegill and pumpkinseed sunfish, a more desirable size distribution, and higher catch rates by anglers. Post-treatment growth increments of bluegills ranged from 14.0 to 70.3 percent higher for different age-classes and average weights were 2-3 times higher; mean condition factors (K) improved 30 percent; and the average catch per man-hour of angling increased five-fold. the proportion of bluegills 6.0 inches TL or larger increased from less than 20 percent to more than 75 percent in angler's catches. Responses in growth and condition of pumpkinseeds were similar to those of bluegills. Shoreline seine catches of yy largemouth bass were high the first year after treatment and increased each of the following two years. The only evidence of a response to the treatment of Lake Erie was the improved condition of bluegills less than 6.0 inches TL. The water temperature at Lake Erie was 53°F when antimycin was applied, 10°F lower than at Lake Mary.

MARKING AND TAGGING

79-002426 Matthews, J.; Bell, J. D. A SIMPLE METHOD FOR TAGGING FISH UNDERWATER. Calif. Fish Game 65 (2): 113-117. Apr. 1979. SFA 24(3)
[N.S.W. State Fish., P.O. Box N211, Grosvenor St., Sydney, Australia 2000]

79-002427 Yamada, S. B.; Mulligan, T. J.; Fairchild, S. J. STRONTIUM MARKING OF HATCHERY-REARED COHO SALMON (/ONCORHYNCHUS KISUTCH/, WALBAUM). J. Fish Biol. 14 (3): 267-275. Mar. 1979. SFA 24(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada] In the management of salmonid populations it is often necessary to distinguish hatchery-reared from wild stocks. This study examines the feasibility of marking fish tissue by substituting a biologically rare element, strontium, for calcium. Sixteen-month-old hatchery-reared coho salmon (/Oncorhynchus kisutch/, Walbaum 1792) were fed a diet, to which 10000 ppm stable strontium was added, for 60 days. Prior to their seaward migration in June 1976, the treated coho contained 32 times as much strontium in their vertebrae as did the control coho. Sixty-eight precocious males 'jacks' returned to the hatchery in the fall of 1976 and 1200 adults in the fall of 1977. Strontium-treated 'jacks' contained 1.4 times as much strontium as did control 'jacks' however, treated and untreated fish could not be distinguished as adults. The reduction in the strontium concentration of the treated fish could be accounted for by growth.

STOCKING AND INTRODUCTIONS

79-002428 Brynildson, O. M.; Brynildson, C. L. DISTRIBUTION AND DENSITY OF SCULPINS IN A WISCONSIN COULEE STREAM. Wis. Dep. Nat. Resour. Res. Rep. 98. 5p. 1978. SFA 24(3)
[Rt. 1, Box 159 A, Neillsville, WI 54456] The mottled sculpin, /Cottus bairdi/ Girard, was successfully introduced into Trout Creek, a coulee stream, in southwestern Wisconsin. Eight years after they were stocked in Trout Creek, the sculpins occupied all trout water that flowed over gravel or rubble, and had increased from the number stocked by over 20 fold. The highest biomass attained by age 1+ sculpins in Trout Creek was 47 kg/ha in a 274-m section of the stream, six years after the sculpins had been introduced. All evidence indicates that the mottled sculpin in Trout Creek has not influenced the strength of wild brown trout year classes present in the stream.

79-002429 Inman, C. R.; Forshage, A. A.; White, E. BRAGGING BASS FOR TEXANS. Tex. Parks Wildl. 37 (5): 10-13. May 1979. SFA 24(3)
[2205 Suanne, Tyler, TX 75701] A discussion of the introduction of Florida strain largemouth bass in Texas.--RS

79-002430 MacKinnon, C. N.; Genoe, H.; Sinclair, D. C. FUNTLEDGE RIVER PROJECT 1972-1977. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 842. v + 126p. Feb. 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 1090 W. Pender St., Vancouver, BC V6E 2E1, Canada]

79-002431 Wahle, R. J.; Koski, K. C.; Smith, R. Z. CONTRIBUTION OF 1960-63 BROOD HATCHERY-REARED SOCKEYE SALMON, /ONCORHYNCHUS NERKA/, TO THE COLUMBIA RIVER COMMERCIAL FISHERY. NOAA Fish. Bull. 77 (1): 229-242. Jan. 1979. SFA 24(3)
[NMFS, 811 N.E. Oregon, Portland, OR 97208]

FISHING GEAR AND TECHNIQUES

79-002432 Dutta, S. N. ON THE GILL NETS OF THE HOOGHLY-MATLAH ESTUARINE SYSTEM (WEST BENGAL) WITH SPECIAL REFERENCE TO THEIR SPECIFICATIONS AND OPERATION. J. Inland Fish. Soc. India 5: 29-36. Dec. 1973. SFA 24(3)

79-002433 Ghosh, K. K.; Sinha, M.; Srivastava, N. K. ON THE ESCAPEMENT OF CARP HATCHLINGS FROM SHOOTING NETS. Indian J. Fish. 20 (2): 395-410. 1973. SFA 24(3)

79-002434 Gross, J. M.; Schroeder, P. SIMULATED EFFECT OF A FISH TRAP ON REEF FISH. Fla. Sci. 42 (Suppl. 1): 22. 1979. Abstract only. SFA 24(3)
[South Fla. Environ. Res. Found., 11550 S.W. 108 Ct., Miami, FL 33176]

79-002435 Miura, T. [SYSTEMS ENGINEERING APPROACHES TO THE STUDIES OF FISHING GEAR--II. MODELING AND SIMULATION OF THE FISH BEHAVIOR IN A TRAP.] Bull. Jpn. Soc. Sci. Fish. 45 (1): 17-23. Jan. 1979. In Japanese with English summ. SFA 24(3)
[Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

79-002436 Singh, S. P. A SPECIAL METHOD OF FISH TRAPPING IN RIVER GANGA AT VARANASI. J. Bombay Nat. Hist. Soc. 71 (1): 153-156. 1974. SFA 24(3)

79-002437 Strange, E. S. A GUIDE TO THE PREPARATION OF NET DRAWINGS. Scott. Fish. Inf. Pam. no. 2. 18p. 1978. SFA 24(3)
[Mar. Lab., Aberdeen, Scotland]

79-002438 Tyler, R. W. METHOD OF SAMPLING SEAWARD MIGRATIONS OF JUVENILE SALMON. Prog. Fish-Cult. 41 (2): 78-81. Apr. 1979. SFA 24(3)
[Coll. Fish., Univ. Wash., Seattle 98195]

FERTILIZATION OF WATER AND SOIL

79-002439 Ghosh, S. R. A STUDY OF THE RELATIVE EFFICIENCY OF MUSTARD OIL CAKE AND UREA AND THE EFFECT OF SALINITY IN PLANKTON PRODUCTION IN INDIAN FISHPONDS. Hydrobiologia 62 (1): 89-92. 8 Jan. 1979. SFA 24(3)
[Cent. Inland Fish. Res. Sub-Stn. 19, Cantonment Rd., Cuttack-1, Orissa, India] Augmentation of plankton production in Indian fishponds by application of manure and inorganic fertilisers was studied in laboratory experiments. The effects of the salinity of the medium were also examined. Laboratory trials were made with mustard oil cake and urea on equivalent nutrient bases in media with varying degrees of salinity (0-30 ppt at 2 ppt. intervals). It was observed that /Closterium/, /Fragilaria/, /Pinnularia/ and /Gyrosigma/ grew well in higher salinity range between 24 to 30 ppt. whereas lower salinities ranging from a trace to 8 ppt. are suitable for improved production of /Anabaena/, /Synedra/, /Navicula/, /Amphipleura/, /Amphora/ and /Nitzschia/. Comparatively better production of plankton was recorded with urea than with mustard oil cake.

79-002440 Parameswaran, S.; Radhakrishnan, S.; Selvaraja, C.; Bhuyan, B. R. FISH YIELD FROM ASSAM PONDS KEPT UNDER DIFFERENT EXPERIMENTAL CONDITIONS. Indian J. Fish. 18: 67-83. 1971. SFA 24(3)

79-002441 Saha, G. N.; Chatterjee, D. K.; Raman, K. OBSERVATIONS ON MANURING NURSERY PONDS WITH ONLY CHEMICAL NITROGENOUS FERTILIZERS FOR SUCCESSFUL REARING OF CARP SPAWN. J. Inland Fish. Soc. India 6: 162-166. Dec. 1974. SFA 24(3)

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

79-002442 Boreman, J.; Goodyear, C. P.; Christensen, S. W. AN EMPIRICAL TRANSPORT MODEL FOR EVALUATING ENTRAINMENT OF AQUATIC ORGANISMS BY POWER PLANTS. U.S. Fish Wildl. Serv. FWS/OBS-78/90. xiii + 67p. Nov. 1978. SFA 24(3)
[U.S. FWS, 2929 Plymouth Rd., Room 206, Ann Arbor, MI 48105]

79-002443 Dane, B. G. CULVERT GUIDELINES: RECOMMENDATIONS FOR THE DESIGN & INSTALLATION OF CULVERTS IN BRITISH COLUMBIA TO AVOID CONFLICT WITH ANADROMOUS FISH. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 811. v + 57p. Oct. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 1090 W. Pender St., Vancouver, BC V6E 2P1, Canada]

79-002444 Dane, B. G. A REVIEW & RESOLUTION OF FISH PASSAGE PROBLEMS AT CULVERT SITES IN BRITISH COLUMBIA. Fish Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 810. xi + 126p. Sept. 1978. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 1090 W. Pender St., Vancouver, BC V6E 2P1, Canada]

79-002445 Jensen, L. D., (ed.) FOURTH NATIONAL WORKSHOP ON ENTRAINMENT AND IMPINGEMENT. EA Communications, Towson, MD 404p. 1978. Available at $14.95 plus $1.50 handling and postage from EA Communications, Ecological Analysts, Inc., York Bldg., 8600 LaSalle Rd., Towson, MD 21204. SFA 24(3)
A collection of 39 papers and panels.--RS

79-002446 Leslie, J. K.; Kozopas, R.; Hyatt, W. H. CONSIDERATIONS OF ENTRAINMENT OF LARVAL FISH BY A ST. CLAIR RIVER, ONTARIO, POWER PLANT. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 686. v + 25p. June 1979. In English with French summ. SFA 24(3)
[Great Lakes Biolimnol. Lab., Can. Cent. Inland Waters, 867 Lakeshore Rd., Burlington, ON L7R 4A6, Canada]

MATHEMATICS, STATISTICAL METHODS AND MODELING

79-002447 Rivard, D.; Doubleday, W. G. APL PROGRAMS FOR STOCK ASSESSMENT, INCLUDING A SENSITIVITY ANALYSIS WITH RESPECT TO INPUT PARAMETERS. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 853. iv + 80p. Mar. 1979. In English with French summ. SFA 24(3)
[Fish. Oceans, Fish. Res. Br., 240 Sparks St., Ottawa, ON K1A 0E6, Canada]

79-002448 Shetty, H. P. C.; Ghosh, K. K. ON THE COLLECTION OF CAPTURE FISHERIES STATISTICS IN THE MAHANADI ESTUARY. Indian J. Fish. 10 (1a): 48-58. 1963. SFA 24(3)

79-002449 Straskraba, M. NATURAL CONTROL MECHANISMS IN MODELS OF AQUATIC ECOSYSTEMS. Ecol. Model. 6 (4): 305-321. May 1979. SFA 24(3)
[Hydrobiol. Lab. Bot. Inst., Czech. Acad. Sci., CS-15105 Prague, Czechoslovakia] Based on cybernetic categories of natural control mechanisms, four generations of ecosystem models are distinguished: feed-forward, feedback, self-adaptation and self-organization models. The analysis of the natural control mechanisms in aquatic ecosystems suggests that different processes are controlled in different ways, and, although the four mechanisms were identified in historical sequence, they all operate simultaneously. The concept of self-organization of an ecosystem is introduced and specified for a model of an aquatic pelagic ecosystem. The concept of the ecosystem as a multilayer, multigoal and multiechelon hierarchical system with hierarchy of the levels of biological organization is also introduced.

LAKE MANAGEMENT & RESEARCH

79-002450 Bennett, J. R. SOME EFFECTS OF MANIPULATION ON A POPULATION OF BROOK TROUT IN HIGH MOUNTAIN LAKES. J. Colo.-Wyo. Acad. Sci. 11 (1): 7. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Wyo., Laramie] Many of the 80-odd subalpine lakes in the Snowy Range (of southeastern Wyoming) have dense populations of stunted brook trout. Perhaps trout that are larger and more easily caught would more closely hold the fishing attention of tourists, and better utilization of this area might ensue. It is thought that a severe climate, short growing season, low quality/quantity of food, etc. are the major reasons for the abundance of small slow-growing brook trout in the Rocky Mountain region. To determine whether the growth and average size of a natural brook trout population could be enhanced practically, I began to manipulate the trout population of Little Brooklyn Lake in June 1976. Trout were removed via seining, trapping, electroshocking, etc. and immigration into the lake and spawning was frustrated by barriers and traps. Over 1,900 brook trout were thus removed or denied access to the lake during the three past summers. Each September a mark-recapture population estimate was undertaken. Population levels were about 2,100 fish in 1976 and 1977, but dropped to about 700 trout in 1978--probably a result of a winterkill in the 8 acre lake between the summers of 1977 and 1978. Also each fall fish were captured for an age-and-growth study. The estimated parameters suggest an increase in population growth rates for each successive year. But the average size of trout in the fisherman's creel has fallen significantly from 1977 levels--perhaps resulting from the above mentioned winterkill. This and other facets of brook trout population dynamics will be discussed in some detail.

79-002451 Fedorenko, A. Y.; Fraser, F. J.; Lightly, D. T. A LIMNOLOGICAL AND SALMONID RESOURCE STUDY OF NITINAT LAKE: 1975-1977. Fish. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 839. vi + 86p. May 1979. In English with French summ. SFA 24(3)
[Fish. Mar. Serv., 1090 W. Pender St., Vancouver, BC V6E 2P1, Canada]

79-002452 Guillory, V.; Jones, M. D.; Rebel, M. A COMPARISON OF FISH COMMUNITIES IN VEGETATED AND BEACH HABITATS. Fla. Sci. 42 (3): 113-122. 1979. SFA 24(3)
[Fla. Game Fresh Water Fish Comm., P.O. Box 1903, Eustis 32726]

79-002453 Moffett, M. F.; Cooke, G. D.; Myers, D. N. CHANGES IN THE MICROCRUSTACEAN COMMUNITY OF EUTROPHIC WEST TWIN LAKE FOLLOWING LAKE RESTORATION. Ohio J. Sci. 79: 96. Apr. 1979. Abstract only. SFA 24(3)
[Dep. Biol. Sci., Kent State Univ., Kent, OH 44242]

RIVER AND STREAM MANAGEMENT & RESEARCH

79-002454 Ellis, R. J.; McNeil, W. J. POSSIBLE MANAGEMENT PROCEDURES FOR INCREASING PRODUCTION OF SOCKEYE SALMON SMOLTS IN THE NAKNEK RIVER SYSTEM, BRISTOL BAY, ALASKA. NOAA Tech. Rep. NMFS SSRF 733. iii + 9p. Apr. 1979. SFA 24(3)
[NMFS, P.O. Box 155, Auke Bay, AK 99821] About 35 percent of the Naknek River system is greatly underutilized by juvenile sockeye salmon, /Oncorhynchus nerka/. In two basins the cause seems to be a lack of spawning grounds, and in a third basin the cause may be too few spawners or poor quality spawning grounds. The annual yield of adult sockeye salmon to the fishery could probably be increased by about 200,000 to 300,000 fish by increasing the production of smolts. Artificial production of fry, along with improving or increasing the spawning environments, is recommended. The numbers of adult females, eggs, and fry required to fully seed the three underutilized basins are discussed. Attempts to increase the production of sockeye salmon in the Naknek River system must be accompanied by detailed biological studies to determine optimum seeding levels and establish cause-and-effect relations.

79-002455 Hume, D. J. CENSUS OF FISH IN THE TULLAROOP CREEK SYSTEM, VICTORIA. Victoria Fish. Wildl. Pap. No. 19. 12p. Feb. 1979. SFA 24(3)
[Fish. Wildl. Div., Arthur Rylah Inst. Environ. Res., Brown St., Heidelberg, Victoria 3084, Australia]

79-002456 Theis, M. K.; Windell, J. T. ANALYSIS BY STREAM ORDER OF THREE COLORADO RIVERS WITH NORTH, SOUTH AND EASTERN DIRECTIONAL EXPOSURES. J. Colo.-Wyo. Acad. Sci. 11 (1): 9-10. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder]

79-002457 Zillis, P. J.; Windell, J. R. NUMBER, LENGTH, ELEVATION AND DIRECTIONAL EXPOSURE OF EPHEMERAL HEADWATER STREAMS IN COLORADO. J. Colo.-Wyo. Acad. Sci. 11 (1): 9. Apr. 1979. Abstract only. SFA 24(3)
[Univ. Colo., Boulder] The purpose of this study was to compare and contrast the number, length, width, gradient and directional exposure of ephemeral headwater streams in three Colorado watersheds arising at the continental divide. A stream order analysis was conducted using the Horton-Strahler method and 1/24,000 USGS mapping. Data were recorded for the upper Roaring Fork, Frying Pan and Crystal Rivers. Detailed analysis indicated that number, total length, gradient, physical habitat and productivity of small high elevation ephemeral streams show little or no resemblance to small low elevation closed canopy streams.

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT

79-002458 Barman, E. H., Jr.; Baarda, D. G. AN EVALUATION OF THE EFFECT OF DRAWDOWN ON THE TROPHIC STATUS OF A SMALL RESERVOIR. Ga. Inst. Technol. Environ. Res. Cent. ERC Q1-78. ix + 73p. Jan. 1978. Available from Environ. Res. Cent., Ga. Inst.Technol., Atlanta 30332. SFA 24(3)

LARGE IMPOUNDMENT MANAGEMENT & RESEARCH

79-002459 Allan, R. C. A BIOLOGICAL ASSESSMENT OF LARGEMOUTH BASS TOURNAMENTS IN SOUTHERN NEVADA. Cal-Neva Wildl. Trans. p. 122-126. 1978. SFA 24(3)

[Nev. Dep. Fish Game, Las Vegas] An attempt is made to determine the survival of largemouth bass, /Micropterus salmoides/, that are captured, held, and released during competitive fishing events on Lake Mead and Lake Mohave. Comparisons are made on rate of recapture by anglers on various groups of tagged bass, including tournament releases, electrofishing releases, and transported bass from other sources. The data shows a pronounced difference of recapture rate between the various groups. Tag returns are generally poorer for all groups of tournament captured bass. Observations on stress of such groups demonstrates an association between tournament bass and severely stressed bass from other sources, Currently, the impact of competitive fishing on the bass resource of southern Nevada cannot be determined. Although, the impact on bass population is probably small, recommendations are made to minimize waste of the resource.

79-002460 Hochman, L.; Hetesa, J. K PROBLEMATICE ZARYBNOVANI VODARENSKYCH NADRZI S VYSKYTEM NIZKYCH HODNOT PH. [ON THE PROBLEM OF STOCKING FISH TO WATER-SUPPLY RESERVOIRS WITH THE OCCURRENCE OF LOW PH VALUES.] Vertebr. Zpravy 1978: 56-60. 1978. In Czech with English summ. SFA 24(3)

Low values of pH develop in streams and reservoirs in peat-bog areas as well as through the action of industrial exhalations. Investigations on six reservoirs in two areas revealed that brook trout are capable of tolerating a decrease down to pH 4.5 and still reproducing naturally; /Salmo trutta/ and /Parasalmo gairdneri/ can be used for stocking waters with pH higher than 5.5; /Acerina cernua/ and /Perca fluviatilis/ can produce naturally in reservoirs with pH round 6.0. Under these pH values, also carp and tench may occur. Repopulation of reservoirs was made possible by using chemicals to decrease water acidity.

79-002461 Holcik, J. RYBY AKO LIMITUJUCI FAKTOR BIOMASY ZOOPLANKTONU, SO ZRETEL'OM NA VODARENSKE UDOLNE NADRZE. [FISH AS THE FACTOR LIMITING ZOOPLANKTON BIOMASS, WITH PARTICULAR REFERENCE TO WATER-SUPPLY RESERVOIRS.] Vertebr. Zpravy 1978: 33-38. 1978. In Czech with English summ. SFA 24(3)

In the water-supply reservoir Klicava, studied by the author for many years, the zooplankton biomass decreased during the first few years after filling due to increased predation resulting from increased fish population density. In subsequent years, the fish exerted little influence on zooplankton, apparently due to structural changes occurring in the zooplankton community. Of two dominate fish species, /Perca fluviatilis/ had the decisive influence on the decrease in zooplankton biomass. It is recommended that increased attention be paid to the selection of fish species for water-supply

79-002461 CONTINUED
reservoirs. Wherever plankton-feeding species occur in the autochthonous fish community, it is necessary to stock predators, namely /Stizostedion lucioperca/.

79-002462 Hrbacek, J. LIMNOLOGICKE PODKLADY PRO POSUZOVANI VHODNOSTI UCELOVE RYBI OBSADKY VE VODARENSKYCH UDOLNICH NADRZICH. [LIMNOLOGICAL CRITERIA OF THE SUITABLENESS OF AIMED FISH POPULATIONS OF WATER SUPPLY RESERVOIRS.] Vertebr. Zpravy 1978: 28-33. 1978. In Czech with English summ. SFA 24(3)
Isolated application of limnological data in relation to either the quality of water or fishery does not correspond with the present knowledge of the interactions between the various organism groups in a freshwater ecosystem. A suitable, little numerous fish population may serve for positively affecting the quality of water supplied by valley reservoirs. The requirement for a little numerous fish population is not at variance with optimum fishery utilization, since both theory and fishery practice show that only a little numerous fish population exhibits rapid growth and, hence, provides an opportunity for optimum utilization either for breeder production or for quality flesh production.

79-002463 Kral, K. ZKUSENOSTI S UCELOVYM RYBARSKYM HOSPODAROVANIM NA NEKTERYCH VODARENSKYCH NADRZICH VE SPRAVE PODNIKU POVODI MORAVY. [EXPERIENCE OBTAINED WITH AIMED FISHERY MANAGEMENT OF CERTAIN WATER-SUPPLY RESERVOIRS MANAGED BY THE POVODI MORAVY ENTERPRISE.] Vertebr. Zpravy 1978: 54-55. 1978. In Czech with English summ. SFA 24(3)

79-002464 Lusk, S. NAVRH UCELOVE RYBI OBSADKY PRO VODARENSKOU NADRZ SLUSOVICE II--KASAVA. [SUGGESTIONS FOR A FISH POPULATION TO BE STOCKED TO THE WATER-SUPPLY RESERVOIR SLUSOVICE II--KASAVA.] Vertebr. Zpravy 1978: 50-54. 1978. In Czech with English summ. SFA 24(3)

79-002465 Lusk, S.; Gajdusek, J.; Krcal, J. RYBARSKE OBHOSPODAROVANI STARSICH VODARENSKYCH NADRZI MOSTISTE, VIR A KORCANY. [FISHERY MANAGEMENT OF OLDER WATER-SUPPLY RESERVOIRS MOSTISTE, VIR AND KORYCANY.] Vertebr. Zpravy 1978: 46-49. 1978. In Czech with English summ. SFA 24(3)

79-002466 Lusk, S.; Vostradovsky, J. RYBY A RYBARSKE HOSPODAROVANI VE VODARENSKYCH NADRZICH. [FISHES AND FISHERY MANAGEMENT OF WATER-SUPPLY RESERVOIRS.] Vertebr. Zpravy 1978: 20-28. 1978. In Czech with English summ. SFA 24(3)
The data obtained on the possible interactions between the fish population and water quality in a water-supply reservoir, manifesting themselves mainly in an indirect way through the predation of zooplankton feeders (carp, bream, roach, perch) on the larger components of zooplankton, thus affecting or accelerating phytoplanktonic overpopulations, have recently resulted in increased attention being paid to the role of the various fish species in the biosystem of water-supply reservoirs. The introduction of aimed fishery management appears to be most satisfactory for every water-supply reservoir. Within this system, the essential part falls on an aimed fish population, consisting largely of species the numbers of which can be easily controlled (either by stocking or by fishing) which can exert a predation pressure on species undesirable from the water management point of view. The following are the basic elements of aimed fish populations for water-supply reservoirs in Czechoslovakia: /Salmo trutta/, /S. gairdneri/, /Salvelinus

79-002466 CONTINUED
fontinalis/ (these salmonid species being particularly suitable for smaller reservoirs during the first few years of existence), /Esox lucius/, /Stizostedion lucioperca/, /Silurus glanis/, /Aspius aspius/ (these species being of general use). Factors affecting or governing the development of the fish population in a water-supply reservoir after filling and those affecting its subsequent development are discussed.--From abstr.

79-002467 Lusk, S. VYVOJ UCELOVYCH RYBICH OBSADEK A RYBI HO OSIDLENI VE VODARENSKYCH NADRZICH OPATOVICE A LANDSTEJN. [DEVELOPMENT OF AIMED FISH POPULATIONS IN WATER-SUPPLY RESERVOIRS OPATOVICE AND LANDSTEJN.] Vertebr. Zpravy 1978: 41-46. 1978. In Czech with English summ. SFA 24(3)
A review is given of the development of the fish population in water-supply valley reservoirs Opatovice (1972) and Landstejn (1974) during the first years of their existence. Both reservoirs were stocked with an aimed fish population of the salmonid type (brown and rainbow trout). Illegally, pike and roach were stocked to the Opatovice reservoir and their numbers increased very much. Illegal angling decimated the stock of salmonids and therefore, it is intended to use pike and perchpike as the basic components of the aimed fish population in future. In the Landstejn reservoir, perch increased in number and pike occurred as well. For the time being, no consideration is given to altering the aimed fish population in this reservoir, consisting of brown and rainbow trout and supplemented by pike.

79-002468 Mathew, P. P. LIMNOLOGY AND PRODUCTIVITY OF GOVINDGARH LAKE, REWA, MADHYA PRADESH. J. Inland Fish. Soc. India 7: 16-24. Dec. 1975. SFA 24(3)

79-002469 Pivnicka, K. SUKCESE RYBICH DRUHU V UDOLNICH NADRZICH NA PRIKLADU UDOLNI VODARENSKE NADRZE KLICAVA. [SUCCESSION OF FISH SPECIES IN VALLEY RESERVOIRS, DEMONSTRATED ON THE EXAMPLE OF THE WATER-SUPPLY RESERVOIR KLICAVA.] Vertebr. Zpravy 1978: 39-40. 1978. In Czech. SFA 24(3)

79-002470 Robertson, P. BIG BLUE. S. C. Wildl. 26 (2): 26-28. Mar.-Apr. 1979. SFA 24(3)
The fishery for blue catfish, /Ictalurus furcatus/, in Santee-Cooper, South Carolina.--RS

79-002471 Stone, R. C.; Eiserman, F. BACKGROUND OF FLAMING GORGE RESERVOIR FISHERIES INVESTIGATIONS. Utah State Div. Wildl. Resour. Publ. No. 78-9. 13p. 1979. Available from Utah State Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116. SFA 24(3)

79-002472 U.S. Fish and Wildlife Service RESERVOIR ECOSYSTEMS AND WESTERN COAL DEVELOPMENT IN THE UPPER MISSOURI RIVER BASIN. A SUMMARY REPORT. U.S. Fish Wildl. Serv. FWS/OBS-78/25. 13p. 1978. SFA 24(3)
[U.S. FWS, WELUT, 2625 Redwing Rd., Fort Collins, CO 80526]

79-002473 Vostradovsky, J. PREDPOVEZ VYVOJE RYBARSKYCH POMERU VE VODARENSKE NADRZI RIMOV. [FORECASTED DEVELOPMENT OF FISHERY RELATIONS IN THE WATER-SUPPLY RESERVOIR RIMOV.] Vertebr. Zpravy 1978: 61-64. 1978. In Czech with English summ. SFA 24(3)

ESTUARY MANAGEMENT & RESEARCH

79-002474 Leaney, A. J.; Carter, N. M. INDEX: SPECIAL ESTUARY SERIES VOLUMES 1-6. Fish. Environ. Can. Fish. Mar. Serv. Spec. Estuary Ser. iv + 289p. Mar. 1979. SFA 24(3)
[Fish. Mar. Serv., Pac. Environ. Inst., West Vancouver, BC, Canada]

79-002475 Lenanton, R. C. J. FISH AND EXPLOITED CRUSTACEANS OF THE SWAN-CANNING ESTUARY. West. Aust. Dep. Fish. Wildl. Rep. no. 35. 36p. 1978. SFA 24(3)
[Dep. Fish. Wildl., Perth, West. Aust., Australia]

79-002476 Shaheen, A. H.; Yosef, S. F. THE EFFECT OF THE CESSATION OF NILE FLOOD ON THE FISHERY OF LAKE MANZALA, EGYPT. Arch. Hydrobiol. 85 (2): 166-191. 1979. In English with French summ. SFA 24(3)
[Inst. Oceanogr. Fish., Kayet-Bey, Alexandria, Egypt]

MARINE MANAGEMENT & RESEARCH

79-002477 Clark, W. G. THE LESSONS OF THE PERUVIAN ANCHOVETA FISHERY. Calif. Coop. Oceanic Fish Invest. Rep. 19: 57-63. Oct. 1977. SFA 24(3)
[FAO, Rome, Italy] The outstanding features of the Peru upwelling system are high productivity and great variability. No large changes in the parameters of the anchoveta population were detected in the fishery and survey data analyzed in studies done before 1972, but because of deficiencies in the data such changes may have occurred and gone undetected. These studies might have been adequate in a less variable fishery, and even in the anchoveta fishery were useful in that they prevented an excessive increase in fishing effort. But because they did not allow for the possibility of large changes in the behavior of the population, they were of little value when recruitment failed in 1972. The stock's collapse in that year and its apparent failure to recover since are still not understood. In the light of this experience, future studies and management of anchoveta fisheries should take into account the potential for large changes in the parameters of the fish populations and in the meaning of the usual fishery statistics and survey data.

79-002478 Cram, D. L. RESEARCH AND MANAGEMENT IN SOUTHEAST ATLANTIC PELAGIC FISHERIES. Calif. Coop. Oceanic Fish Invest. Rep. 19: 33-56. Oct. 1977. SFA 24(3)
[Sea Fish. Br., Cape Town, South Africa] The South and South West African pelagic fisheries have been subject to serious declines in their most valuable fish population, /Sardinops ocellata/. In both fisheries the anchovy, /Engraulis capensis/, has become important. The history of the fisheries is described and subsequent progress discussed. Adequate legislation has been available as a basis for resource management, but until 1970 was not employed at critical

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periods in the fisheries history, since scientific input was lacking. Methods of past and present management are discussed and advantages of the present system noted. Recent research has shown that problems in these pelagic fisheries are multidisciplinary and that the most rewarding approach to solution is through integrated multidisciplinary research. A period of large scale survey work has highlighted many of the disadvantages of population biology and focussed on the need for rapid ways of detecting adverse change within the fisheries. Future work is described which concentrates on survey work giving rapid stock size estimates whilst producing valuable input in conventional monitoring of fishery statistics.

79-002479 Goulet, J. R., Jr.; Haynes, E. D. , (ed.) OCEAN VARIABILITY: EFFECTS ON U.S. MARINE FISHERY RESOURCES-1975. NOAA Tech. Rep. NMFS Circ. 416. iii + 350p. Dec. 1978. SFA 24(3)
[NMFS, Washington, DC 20235] Ocean variability, and its effects on U.S. marine fishery resources in 1975, is summarized. Also included is a collection of data products and contributed papers focusing on the impacts on fisheries resources of ocean variability. The emphasis is on large scale, both in time and space, environmental processes, the variations of index properties, and the consequent modulations of fisheries responses.

79-002480 Hilborn, R.; Ledbetter, M. ANALYSIS OF THE BRITISH COLUMBIA SALMON PURSE-SEINE FLEET: DYNAMICS OF MOVEMENT. J. Fish. Res. Board Can. 36 (4): 384-391. Apr. 1979. In English with French summ. SFA 24(3)
[Dep. Environ., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

79-002481 Jolley, J. W., Jr.; Irby, E. W., Jr. SURVIVAL OF TAGGED AND RELEASED ATLANTIC SAILFISH (/ISTIOPHORUS PLATYPTERUS/: ISTIOPHORIDAE) DETERMINED WITH ACOUSTICAL TELEMETRY. Bull. Mar. Sci. 29 (2): 155-169. Apr. 1979. SFA 24(3)
[Fla. Dep. Nat. Resour. Mar. Res. Lab., 100 8th Ave. SE, St. Petersburg 33701] During 1974-1976, eight accustical tracking experiments were conducted along southeast Florida to assess immediate mortality of tagged and released Atlantic sailfish, /Istiophorus platypterus/. All sailfish were caught by rod and reel, tagged externally with ultrasonic transmitters, and tracked for periods of 2 h 56 min to 28 h 21 min. Condition of each specimen at release was determined by observations of injury, extent of exercise period, and handling. No relationship was noted between size (age) and condition state. Seven sailfish survived. One specimen sustained severe eye injury, bled profusely, and was attacked and killed by a shark 6 h 25 min after release. Twenty minutes appeared sufficient to at least slightly exhaust most sailfish. It is recommended that anglers strive to catch specimens within this time period. The survival of seven sailfish supports the continuance of releasing programs. Effect of tagging mortality on return rates now appears less significant.

79-002482 Kaneen, R. G. CALIFORNIA'S VIEW OF ANCHOVY MANAGEMENT. Calif. Coop. Oceanic Fish Invest. Rep. 19: 25-27. Oct. 1977. SFA 24(3)
[Calif. Dep. Fish Game, Sacramento]

79-002483 Lluch B., D. THE MEXICAN VIEW OF THE BASIC RESEARCH NEEDS FOR THE MANAGEMENT OF THE ANCHOVY FISHERY. Calif. Coop. Oceanic Fish Invest. Rep. 19: 28-32. Oct. 1977. SFA 24(3)
[Inst. Nacl. Pesca, Mexico City, Mexico]

MISC. TECHNIQUES AND EQUIPMENT

79-002484 Goodbred, S.; Occhiogrosso, T. METHOD FOR PHOTOGRAPHING SMALL FISH. Prog. Fish-Cult. 41 (2): 76-77. Apr. 1979. SFA 24(3)
[U.S. FWS, Ecol. Serv., 1825 B Virginia St., Annapolis, MD 21401]

79-002485 Grimes, C. B.; Hollingsworth, J. E. AN AUTOMATIC DATA PROCESSING SYSTEM FOR STORAGE AND MANIPULATION OF LIFE HISTORY, CATCH, AND ANGLER EFFORT DATA. Estuaries 2 (2): 123-126. June 1979. SFA 24(3)
[Dep. Environ. Resour., Cook Coll., Rutgers Univ., New Brunswick, NJ 08903]

79-002486 Miller, S. M.; Gaffney, F. G. SYSTEM IBCCK: A FISHERIES LOGBOOK INFORMATION MANAGEMENT SYSTEM. Alaska Dep. Fish Game Inf. Leafl. No. 178. 69p. Feb. 1979. SFA 24(3)
[U.S. FWS, 1011 East Tudor Rd., Anchorage, AK 99503]

79-002487 Penrose, J. D.; Kaye, G. T. ACOUSTIC TARGET STRENGTHS OF MARINE ORGANISMS. J. Accust. Soc. Am. 65 (2): 374-380. Feb. 1979. SFA 24(3)
[West. Australian Inst. Technol., Phys. Dep., South Bentley, West. Australia 6102]

79-002488 Williams, D. D. AIR-POWERED STREAM TANK FOR LABORATORY USE. Prog. Fish-Cult. 41 (2): 88-89. Apr. 1979. SFA 24(3)
[Div. Life Sci., Scarborough Coll., Univ. Toronto, West Hill, ON M1C 1A4, Canada]

REVIEWS, BIBLIOGRAPHIES, ETC.

79-002489 Atton, F. M.; Johnson, R. P.; Smith, N. W. BIBLIOGRAPHY OF LIMNOLOGY AND AQUATIC FAUNA AND FLORA OF SASKATCHEWAN 1974. Saskatchewan Dep. Tourism Renewable Resour. Fish. Bull. no. 10. vi + 33p. 1974. Available from Ext. Serv., Dep. Tourism Renewable Nat. Resour., Admin. Bldg., Regina, SK, Canada. SFA 24(3)
The Bibliography of Limnology and Aquatic Flora and Fauna of Saskatchewan lists references dealing with the limnobiology of Saskatchewan lakes and streams from 1836 to 1972 inclusive. The references are arranged alphabetically by senior author, and are accompanied by key words indicating their principal content. Indices to the titles are provided under 77 topics in 7 categories, namely:

79-002489 CONTINUED
General (2); Biology (8); Ecology (10); Limnology (22); Management (8); Organisms (12); Pisces-Fish (15).

79-002490 Brandt, A. V. , (compiler) BIBLIOGRAPHY FOR FISHERMEN'S TRAINING. FAO Fish. Tech. Pap. No. 184. ix + 176p. 1978. SFA 24(3)
[2 Hamburg 76, Karlstrasse 32, West Germany]

79-002491 Hartmann, D. I.; Hartmann, L. A.; von Geldern, C. E. A BLUEGILL BIBLIOGRAPHY WITH ABSTRACTS AND ANNOTATIONS. Calif. Dep. Fish Game Inland Fish. Admin. Rep. No. 79-1. 196p. Dec. 1978. SFA 24(3)
[C. E. von Geldern, Jr., Calif. Dep. Fish Game, Inland Fish. Br., Sacramento] An annotated bibliography on bluegill (/Lepomis macrochirus/) biology and management was prepared. The /Sport Fishery Abstracts/, /Aquatic Sciences and Fisheries Abstracts/, and other publications and journals were systematically searched for articles on bluegill. Articles were reviewed, annotated, and assigned to various subject categories within three broad topic areas: life history, population statistics, and management.

Abdulla, A. M.
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Abrahamsson, T.
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Abreu-Grobois, A.
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Ackman, R. G.
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Addison, R. F.
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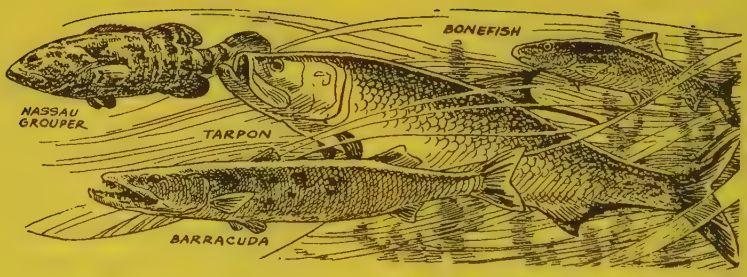
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